DEPARTMENT

—FOR—

SUPPLYING THE CITY WITH WATER.

ANNUAL REPORT

—OF THE—

Chief Engineer of the Water Department,

—OF THE—

CITY OF PHILADELPHIA,

FOR THE YEAR 1879.

PRESENTED TO COUNCILS APRIL 29, 1880.

Philadelphia:
JOHN D. AVIL TELEPHONE PRINT, 4042 MARKET ST.
1880.

COMPLIMENTS OF——

WILLIAM H. McFADDEN,

CHIEF ENGINEER.

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CONTENTS.

ERRATA.

Page 12, line 5, for 45.97 inches rend 44.65 inches.
Page 20, line 22, for $150,000 read $100,000.
Page 59, for Roxborough Auxiliary, Worthington Compound, read Roxborough Auxiliary, Knowles' direct acting pump.
Page 59, for Frankford No. 2, Worthington Compound, read Frankford No. 2, Worthington Duplex.

Committee on Water Works, 1879.

CHARLES THOMSON JONES, *Chairman.*

* Benjamin Allen, James J. Barr, John C. Bickel,
George W. Bumm, Daniel Blair, Frank Dundore,
Daniel Gilbert, John McCullough, David Mouat,
John Rink, Benjamin Saeltzer, William Wright,
Charles K. Merklee, Jo·eph Hacker, Robert A. Jamison,
John Hunter, Alexander Russell, W. Ellwood Rowan,
John A. Anck, W. E. Rex, Thomas B. McAvoy,
Robert R. Hall, Benjamin F. Dotts.

GFORGE A. SMITH, *Ex-officio.* JOSEPH L. CAVEN, *Ex-officio.*

OFFICERS.

Chief Engineer.—WILLIAM H. McFADDEN.

Assistant Engineers.

JOHN L. OGDEN, CHARLES G. DARRACH, D. MC. N. STAUFFER.

General Superintendent of Works.

ROBERT MCFADDEN, JR.

Chief Clerk.—J. T. HICKMAN.

John E. Codman, *Draughtsman.* William J. Innis, *Muster Clerk.*
George W. Eckert, *Pipe Clerk.* William H. Mettam, *Telegraph Operator.*
Thomas J. Lyster, *Messenger.*

Superintendent of City Shop.—JAMES F. NEALL.

Surveyors.

1st District.—James L. Brown, Wharton, above Eleventh.
2d " David A. Craig, 918 Cherry Street.
3d " Charles Shreeve, 1420 Frankford Road.
4th District.—William Ewing, 810 Corinthian Avenue.
Germantown.—D. B. Morrell, Town Hall, Germant'n.
Manayunk.—Henry Dawson, Lyceum Building, Roxbo'h.

Engineers at Works.

Fairmount—Jos. Moyer. A. C. Bonsall, *Belmont*—Abraham Stott, John Smith,
Schuylkill—Josh. Bartley, David Pyke. *Roxborough*—W. A. Smith, Lewis Culp.
Delaware—John Penn, Jos. Thompson. *Frankf'd*—C. H. Douglass, G. W. Wright.
Chestnut Hill—James M'Glenahan.

REGISTRAR'S DEPARTMENT.

Registrar.—W. MARSHALL TAYLOR.

John S. Warner, *Chief Clerk* A. Newlin Keithler, *Receiving Clerk.*
William J. Halliday, *Permit Clerk.* A. Bucheister, *Registering Clerk.*

Entry Clerks.

George Macauley, Robert F. Mustin, Jr.

Bill Clerks.

Joseph Fisher, John Caldwell, John M. Stacker, H. G. Butler.

Inspectors.

John F. Scheidt, E. D. Thomas, John H. Haines,
James H. Graham, W. H. Hargesheimer, Thomas Stewart,
S. D. Woodington, James Carr, H. Marshall,
Lewis Obermiller. William A. Agnew, William Erwin,
E. M. Rowe, C. J. Lowry.

*James Evans in place of Benjamin Allen, deceased.

Committee on Water Works, 1880.

GEORGE W. BUMM, *Chairman.*

John McCullough, James Evans, Frederick Halterman, James J. Barr, W. Ellwood Rowan, John Flanagan, Jerome Beaver, John T. Strickland,
Daniel Blair, Adam Albright, George Roney, Walter Rex, John Hunter, William B. Irvine, Henry Clay, Daniel W. Gilbert,
David Mouat, Thomas H. Green, John C. Bickel, Charles K. Merklee, John Bardsley, John M. Vanderslice, Frank McGrath,

GEORGE A SMITH, *Ex-officio,* JOSEPH L. CAVEN, *Ex-officio.*

OFFICERS.

Chief Engineer.—WILLIAM H. McFADDEN.

Assistant Engineers.

JOHN. L. OGDEN, CHARLES G. DARRACH, JOHN E. CODMAN

General Superintendent of Works.

ROBERT McFADDEN, JR.

Chief Clerk.—J. T. HICKMAN.

W. M. McFadden, *Draughtsman.* W. J. Innis, *Muster Clerk.*
George W. Eckert, *Assistant Clerk.* W. W. Windefield, *Pipe Clerk.*
W. H. Mettam, *Telegraph Operator.* Thomas J. Lister, *Messenger.*

Superintendent of City Shop.—JAMES F. NEALL.

Surveyors.

1st District.—John H. Holmes, Wharton, above Eleventh.
2d " David A. Craig, 918 Cherry Street.
3d " Charles Shreeve, 1420 Frankford Road.
4th District.—William Ewing, 810 Corinthian Avenue.
5th " Henry Dawson, Lyceum Building, Roxb'r, and Town Hall, Germantown.

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Schuylkill—Josh. Bartley, David Pyke. *Roxborough*—W. A. Smith, Lewis Culp.
Delaware—John Penn, Jos. Thompson. *Frankford*—G. W. Wright.
Chestnut Hill—Jas. M'Clenahan, *Assistant Engineer.*

REGISTRAR'S DEPARTMENT.

Registrar.—A. N. KEITHLER.

John S. Warner, *Chief Clerk.* W. J. Halliday, *Receiving Clerk.*
John F. Scheidt, *Permit Clerk.* A. Buckheister, *Registering Clerk.*

Entry Clerks.

George Macauly, Robert F. Mustin, Jr.

Bill Clerks.

Joseph Fisher, John M. Stacker, Charles L. Hayden.

Inspectors.

E. S. Higbee, E. D. Thomas, John H. Haines,
James H. Graham, W. H. Hargesheimer, Thomas Schaeffer,
S. D. Woodington, James Carr, H. Marshall,
Lewis Obermiller, William A. Agnew, William Erwin,
E. M. Rowe, Charles. Lowry.

REPORT

—OF THE—

CHIEF ENGINEER.

REPORT.

To the Presidents and Members of the Select and
Common Councils of the City of Philadelphia.

GENTLEMEN:—For the seventh time I have the honor to submit the Annual Report of the Water Department. In it will be found the operations of the Department for the year ending December 31, 1879.

RECEIPTS.

The total receipts, from all sources, amount to $1,419,179.07, an increase over 1878 of $42,647.02. The total revenues amount to $1,465,625.01, of which $46,445.94, was collected by the City Solicitor, as per his weekly reports to this office.

The following table is a comparison of the receipts and revenues for a series of years, and the sources whence derived.

Years.	Delinquent rents.	Penalties.	Water rents.	Penalties.	Fractional rents.	Water pipe.	Chief Engineer's office.	Total receipts.	Amounts returned to City Solicitor for lien.	Amounts collected by City Solicitor.	Revenues.
1872.....	$22,138 00	$2,188 59	$815,982 50	$17,014 05	$54,467 01	$131,822 96	$10,668 40	$1,054,281 51	$77,467 36	$21,108 90	$1,075,390 41
1873.....	22,705 50	2,824 93	865,696 50	18,095 73	51,974 12	116,997 17	4,691 06	1,082,985 01	75,882 09	26,601 71	1,109,586 72
1874.....	31,164 25	4,483 02	909,899 50	18,434 48	60,108 56	198,896 99	6,994 58	1,229,881 38	152,593 11	31,130 17	1,261,011 55
1875.....	23,106 25	3,329 93	938,357 25	17,625 52	54,667 66	123,258 53	9,321 14	1,169,666 28	122,533 39	65,870 28	1,235,536 56
1876.....	31,971 75	4,324 91	970,814 25	17,202 85	54,711 96	115,034 27	5,694 98	1,199,754 97	81,151 48	52,259 95	1,252,014 92
1877.....	62,104 75	7,957 45	1,008,248 60	16,309 65	53,470 48	73,253 88	6,636 29	1,227,981 10	38,581 54	56,233 57	1,284,214 67
1878.....	136,123 93	19,759 24	1,085,838 41	25,915 19	49,391 90	55,631 89	3,871 49	1,376,532 05	32,223 75	40,113 80	1,416,645 85
1879.....	118,234 15	17,439 36	1,186,001 69	22,931 31	40,516 70	31,235 92	2,819 94	1,419,179 07	22,895 61	46,445 94	1,465,625 01

EXPENDITURES.

From annual appropriations,	$438,884 72
" special "	4,808 96
" loans (extension of works,)	
Total expenditures for 1879,	$443,693 68
Total receipts of the Department,	$1,419,179 07
" expenditures,	443,693 68
Receipts in excess of all expenditures,	$975,485 39
Total receipts,	$1,419,179 07
Less annual and special appropriations,	443,693 68
Profits of the Department for 1879,	$975,485 39
Profits,	$975,485 39
Add amount collected by City Solicitor,	46,445 94
Revenue in excess of expenditures,	$1,021,931 33

The Department furnishes water for public purposes gratuitously, and, by law, to charitable institutions, at fifteen per cent. of the legal rates; these, if paid for, would amount to the interest on the cost of the plant, leaving the profits, as above, fairly to the credit of the Department.

PUMPAGE.

The total pumpage for the year amounts to 19,894,101,515 gallons, an increase over 1878, of 792,437,183 gallons, or more than 4 per cent.; a daily average increase of 2,171,060 gallons. The total pumpage of 1879 over 1876, the Centennial year, was 2,420,793,476 gallons, or nearly 14 per cent., or a daily average increase of 6,906,283 gallons.

The pumpage at Fairmount, by water-power, was 7,278,357,488 gallons, a decrease on the pumpage of 1878 of 1,054,931,276, or more than 12½ per cent, a daily average decrease of 2,890,222 gallons. In 1879 the pumpage at Fairmount was less than any year since 1865, and gave a daily average of only 19,950,213 gallons.

For the first six months in the year the daily average was 24,911,110 gallons, while for the last six months it was only 14,989,316 gallons, and for the months of October and November it was only 9,357,842 gallons. This small pumpage was due to the low stage of water in the river and hence a consequent loss of power to drive

the wheels. Had this occurred in the months of July, August or September the city would have been subjected to a water famine.

An examination of the rain tables of Lebanon and Reading shows a less rain-fall in the valley of the Schuylkill than at Philadelphia.

In 1879 the rainfall at Philadelphia was 45.97 inches, while at Reading it was only 32 inches.

The pumpage at the Spring Garden or Schuylkill Works was 4,468,480,022 gallons, an increase over that of 1878 of 1,565,879,342 gallons, or nearly 54 per cent., a daily average increase of 4,290,-080 gallons. For 1879, the daily average was 12,258,850 gallons. the greatest pumpage ever attained at these works. For the first six months of the year the daily average was only 5,093,918 gallons, while for the last six months it was 19,328,841, nearly four times as great. This variation of pumpage is due to the fact that the Fairmount and Belmont Works are both supplemented by the Spring Garden Works. These latter helping Fairmount during the low stages of water in the river and Belmont at the period of greatest demand and when repairs are necessary.

Their maximum daily average pumpage for a period of twelve days was 27,500,000 gallons, and the greatest daily pumpage was 31,000,000 gallons.

The pumpage at the Belmont Works was 3,954,962,917 gallons, a decrease of 121,574,271. This was due to the want of boiler capacity, it being dangerous to force the boilers by excessive firing beyond what had been done. The daily average was 10,835,515 gallons. The maximum monthly average was in August, September and October, which reached 13,122,072.

The pumpage at the Delaware Works was 2,194,470,977, an increase of 61,396,598 gallons during the year. A section of the distribution, formerly supplied from these works, has, since the distribution pipe was laid on Wheat Sheaf Lane, been supplied by the Frankford Works.

The pumpage at the Frankford Works was 765,551,793, an increase of 232,761,935 gallons during the year, or more than 43 per cent.

The pumpage at the Roxborough Works was 1,141,356,720, an increase of 88,603,237 gallons during the year. At the Auxiliary Works the pumpage to Manatawna was 3,389,250, an increase of 86,190 gallons.

The pumpage at the Chestnut Hill Works was 87,352,350, an increase of 9,264,450 gallons.

Expense of Pumpage.

The total pumpage of 19,894,101,515 gallons equated into work done amounts to 29,787,829,909 gallons, lifted 100 feet high, an increase over 1878 of 3,431,788,602 gallons, or more than 13 per cent.

This work was accomplished at a total expense of $151,033.60, or $5.07 per million gallons lifted 100 feet high as against $6.56 in 1878. That done by water power was 7,278,357,488, at an expense of $3.14, as against $3.73 in 1878. That by steam power was 22,509,472,421, at an expense of $5.69, as against $8.60 in 1878.

THE WORKS.

FAIRMOUNT.

At these works the running gear of *No.* 4 *Turbine* was detached from the walls of the building, and the old runner replaced with a duplex wheel, increasing its efficiency 40 per cent. This was done under the contract with Mr. E. Geyelin, the engineer who had previously furnished and erected all the Turbine wheels at Fairmount.

New valves were set in the pumps of the *No.* 8 *Turbine* and the bevel gear recogged.

The pump rods of No. 9 were packed by the U. S. Metallic Packing Co., the working of which has proved satisfactory.

Plans have been designed for the method of detaching the running gear of *Nos.* 3 *and* 5 *Turbines* from the house, and are on file in the office. The mill house and buildings need extensive repairs.

SPRING GARDEN.

The Engines received the following repairs:

No. 4, *Over-head Cornish,* had new springs set in steam pistons and new valves in the pump.

No. 5, *Side Lever Cornish,* had new springs set in steam piston, steam valves repaired and ground in, parallel motion repaired with new frame and stays. The steam valves need renewal.

No. 6, *Simpson Compound,* had two adjustable rings set on rock shaft, the valves were reset and ground down; new valve seats and stems were placed in the pumps and new ends on the pump rods; the valve-seat lift was fitted with water cushions, and safety valves were placed on the pumps.

No. 7 *Cramp's Independent Compound Engine,* was provided with a new force injection pipe; air pipe connections were made for charging the air vessel; galleries and gratings were built around the pumps and high pressure cylinder. This engine was repaired by the contractors and went into operation June 3d. The inlets and pump wells of each of the engines were thoroughly cleaned, the inlet gates repaired and faced with gum seats. Pipes, 6-inch in diameter, were carried from each of the pump wells, provided with stops and arranged so that a pump located over the forebay can control it or any one of the pump wells.

The Simpson engine, No. 6, was used, *when it could be spared,* to assist the Belmont works in supplying the second system or the higher level east of the river, and was forced, though at some risk,

to pump against a head of 170 feet City Datum, fifty feet higher than had been its previous work.

After midsummer those localities in the 19th, 20th, 25th, and 28th wards, which had suffered from an inadequate supply, were abundantly supplied by this engine, helped by means of automatic valves placed on the supply main from Belmont, and utilizing the 30-inch main on Broad street north of Jefferson street, for the high service, or second system, the first system being supplied from the new 30-inch main laid on Jefferson street from Broad to Ninth, and on Ninth to Dauphin.

In order to utilize the No. 6 Engine as described, safty valves were placed on by-pass pipes around the 30-inch stop on the supply main from Belmont, as well as on the 16-inch main from this 30-inch main at the Spring Garden Basin. These valves regulated the pressure on the distribution and protected the engine from the Belmont head of 212 feet.

It is intended during the coming season to connect this engine directly with the Belmont main, thus providing separate mains for the four engines at the Spring Garden Works, and to provide such valves on the proper mains at the Delaware Basin as will enable these works to supplement those at Kensington, as well as to pump the Cramp Engine, No. 7, directly into the Corinthian Basin.

The need of additional engines and boiler power at these works cannot be too strongly urged. The most trifling accident to any one of the engines or boilers may be the cause of incalculable danger and loss to the city. Plans have been prepared of the necessary additions and alterations to the engine house for the accommodation of additional pumping capacity, and a sketch in perspective of the present condition and proposed alterations is published in this Report.

BELMONT.

At the Belmont Works the following repairs were made:

No. 1, *Worthington Engine.*—The valve seats of the engine were faced, the valves planed, new stems were put in the air-pumps, new valve-stems and brass guard plates were put in the pumps.

Engine No. 3, *Worthington.*—The steam-valves and seats were faced. The crossheads and guide brasses of the air-pumps were renewed and the piston links bushed. Adjustable blocks were placed under and set springs over the steam pistons of each of the engines of No. 1, 2 and 3 to keep them in the centre of the cylinders, and all the steam connections were renewed. The boilers at these works have been so driven that they are in a dangerous condition, and

cannot with safety be forced as in the past. The tracks in the coal bins must be renewed, a gate should be placed on the inlet to each of the pump wells, the forebay should be cleaned, and new stops put on both inlet and pumping mains.

DELAWARE.

The high pressure Engine.—The steam valves were refaced and ground in, the rock shaft was refitted and the steam pipe and valve remodeled and renewed.

The low pressure Engine.—The steam piston rings were set out and a new band was shrunk on the broken crank arm.

The Worthington Engine.—The jacket of one of the low pressure steam cylinders was cracked and repaired in two places. The engine should be provided with a new cylinder. The steam pipe joints were renewed and water-charging pipes put on the pumps.

In the boiler room the steam pipe connections were renewed, the steam drums and cylinder boilers were repaired. The iron of the stand pipe was found defective and had to be plugged in many places. It may be necessary to take it down and convert that part within its foundations into an air vessel.

To avoid the danger from the impurity of the water pumped at this station during the summer and in low stages of the river, such connections have been made with the Reservoir and distribution, as to enable an engine, if placed at the Spring Garden Works, to supplement these works.

ROXBOROUGH.

Cornish Engine.—The steam valves were faced, the links, rods, pins and all connections repaired; the steam piston springs were renewed and a new valve put in the pump.

Worthington Engine.—The slide valve and seats were planed and faced, adjustable blocks were placed under, and set springs over the low pressure piston heads, the valve rods were renewed and steam chest joints made. A new foot valve was put on the suction pipe and water-charging pipes from the main connected with the pumps. The steam pipe connections to and from the boilers were renewed. New steam gages were placed in the boiler room. The cylinder boilers were patched, and the steam pipes and pumps at the auxiliary works were repaired.

The boilers at these works need renewal; the mud-drums on the cylinder-boilers must be removed, and the patent boilers thoroughly overhauled.

CHESTNUT HILL.

No. 1 *Engine* was repaired with a new piston.

No. 2 *Engine* (Knowles) had new packing rings set in steam piston, and a new exhaust pipe. The boilers were patched in two places and are in a very bad condition.

These works are not sufficient to supply the increasing demand of Chestnut Hill, Mt. Airy and the higher portions of Germantown, which sections are rapidly growing. The springs from which the supply is obtained are inadequate and the machinery and boilers old and worn out.

FRANKFORD WORKS.

The Worthington Engine required extensive repairs, new injection pipe, new discharge pipes from the air pump with check valves, new air pump valve and new gum valves, guard plates and stems in the pumps. An 8-inch cast-iron steam pipe taken down at Belmont works was erected instead of the wrought-iron pipe from the boilers to the Cramp Engine and provided with a copper "U" expansion pipe, the whole resting on cast-iron compensating columns. The steam pipe joints in the boiler room were renewed, and cast-iron brackets and bridge walls put in all the boilers. The boiler room was paved with hard brick, an additional track laid and a drain pipe carried from the scales to river. The wood work of the doors and windows were oiled and rubbed.

The contractors repaired the Cramp Engine and replaced the broken pump chambers with others much stronger and of better design, and the engine went into operation May 3d, 1879.

Early in the year it was found that the bottom of the basin leaked, and upon examination the cause was discovered to be that stakes had been driven into the bottom. This leak was partially remedied but after the basin was refilled to a maximum height the trouble still continued, and must, as soon as the weather permits again be emptied and the bottom examined and repaired. The banks and water walls give no signs of trouble.

THE BOILERS.

The boilers of each of the works received their annual cleaning; at Chestnut Hill the boilers are almost worthless, the valves, connections, water columns and gauges were all repaired, and, when it was found necessary, renewed.

THE BUILDINGS, GROUNDS, ETC.

The buildings all need painting and general repairs, those at

Spring Garden and Roxborough need new roofs. The fences around the Belmont works, the Spring Garden forebay and the basin need renewal; the stand-pipe at Spring Garden needs repainting, and the Spring Garden forebay should be cleaned.

THE WATER SUPPLY OF PHILADELPHIA.

One of the four following modes must be determined upon for the future supply:

1. *By Artesian Wells*, which no one would recommend for a city so large and growing so rapidly.

2. *By Water Power*, involving impounding dams in the valley of the Schuylkill, or its tributaries, flooding large areas for the storage of water as power. This mode has to recommend it the small expense of pumpage by water power, but when the interest on the outlay is included, I am persuaded it would be more costly than pumping by steam.

Again, there is a limit to the amount possibly attainable by this means (dependent upon the flow of the river,) which has been determined (for three years) by adding to that actually pumped at Fairmount, the amount that could have been pumped by the utilization as power of all the waste water that passed over the flash boards. By calculating this waste and equating it as power, the *limit as a maximum* would not exceed 50 million gallons per day. This equated to different lifts would still further reduce it to say 40 million gallons per day.

3. *By Gravity*, which has to recommend it purity of source, and, where no other mode is practicable, must be resorted to at whatever cost. Thus by elimination we are reduced to the last mode.

4. *By Steam Power*, which, all things considered, has the most advantages, at the least cost, and is the one likely to be adopted by the authorities of our city, at least for the present and until some future mode is determined upon and *consummated*. This brings us to a consideration of the present supply, which demands immediate attention to prevent any liability of a water famine.

The pressing wants of the Department are in brief, power (involving boilers, engines, and pumps), storage at the proper elevations, and larger distributing mains.

During the last seven years I have importunately urged the authorities to provide the means for these ends, without avail, and it seems to me the City is liable to suffer between the conflict of opinions.

In my judgment it will be much cheaper to prevent than to cure,

and I would most urgently suggest that something be agreed upon and consummated before a calamity overtakes the City. To remove some popular errors, which have been extensively circulated, I would recall to mind the action of the experts who reported in 1875 extensions to the water works involving an expenditure of three millions of dollars, whereupon the Department in 1875 requested a loan of $1,200,000 for the further extension of the water works, including the completion of the East Park Reservoir, which passed common council but failed to secure the sanction of the select branch. Then an appropriation of $500,000 was sought which passed both chambers, but failed to receive the sanction of his Honor the Mayor, since which not one dollar of loan has been provided for the further extension of the works, and I do not think any one will disagree with me when I assert that it will be impossible to continue to extract nearly *four times* as much from the Department as is furnished for its maintenance.

In railroad experience the amount used in their maintenance is nearly 60 per cent of their gross receipts, while for several years there has been but a return for maintenance to the Department of only *thirty per cent.* of its gross receipts. It therefore, must be evident that the course pursued is only an exhaustive one and likely to terminate disastrously to the City.

THE PRESENT.

The maximum daily average consumption, during 1879, for periods of a week, was 65½ millions of gallons, and for a month it was 63½ millions of gallons. During this period a short supply was experienced in portions of the 14th, 19th, 20th, 28th and 29th wards. After midsummer this deficiency was met by supplying the district from the Belmont distribution, by means of a connection with the 30-inch main on Broad street north of Jefferson, which was disconnected from the Corinthian or low service basin. At the same time a connection was made at Broad and Jefferson from the Corinthian basin with the new main on Jefferson street from Broad to 9th and thence north to 20-inch mains on Dauphin street and Susquehanna avenue. These mains were substituted for the 30-inch main on Broad street, which is now used for the high, service distribution as described. These facilities for an abundant supply of water to those districts which formerly had little or none will have a tendency to materially increase the consumption in the summer of 1880.

Under the most favorable circumstances, allowing nothing for contingencies, the total practical capacity of the pumping machinery

of the Department is (see table D) 127 millions of gallons per day. 36 millions by water power and 91 millions by steam power. When the consumption is the greatest, but 72 millions of gallons per day are available as a possible maximum. This loss is occasioned principally by a lack of power.

At Fairmount water-power works the average *loss* last year for a period of twelve consecutive days was *twenty-eight million* gallons.

Eleven million gallons are lost at Spring Garden and Belmont for want of boiler power.

Eleven million gallons are lost at Roxborough and Frankford for want of distributing mains, and duplicate engines; and *three millions* are lost at the Kensington works by reason of tides and defective inlet.

From this description and an inspection of the table, it will be readily seen that, under these conditions, should an accident occur to any of the engines, running when this maximum is needed, or should it become necessary, for repairs or inspection to stop one or more of the engines, and a loss of 6 millions per day be the result, a short supply will be inevitable.

To meet such a contingency and to provide against any serious accident to one of the large engines, a duplicate engine, boilers. etc., were asked for at a cost of $150,000, failing to receive which an engine of 8 million gallons capacity, built to pump against a head of 120 feet, is now forced to pump up to 170 feet; and $50,000 have been asked for boilers at Spring Garden and Belmont works, to utilize the reserve engines available and provide against a contingency involving a loss of 10 millions of gallons per day.

The cost of utilizing to their maximum the machinery at Roxborough and Frankford works, would cost not less than $500,000, while to build impounding dams on the Schuylkill so as to increase the pumpage at Fairmount in summer 10 million gallons per day, the same amount would be required.

To impound enough water in the East Park Reservoir to supply a deficiency of 10 million gallons per day for only 12 days, and at the same time keep up the head of water in the basins, an expenditure of $500,000 will be necessary.

The short supply in portions of the old city proper is occasioned by small mains (of which there are 150,000 feet of 4-inch diameter or less,) as well as the want of proper connections between pipes crossing each other at the intersections. Under existing ordinances the

department is powerless to remedy these defects. South of South street there are 50,000 feet of small pipe and insufficient feeders.

The East side of Broad street from Poplar to Spring Garden is as yet but imperfectly supplied, and should be included in the second system. To accomplish this end it is proposed to connect the 10-inch pipe supplying the houses on Broad street, with the high service distribution and to substitute for it a 16-inch pipe having connections with the streets running east, thereby increasing the facilities for a better supply in the district east of Broad and north of Callowhill.

It has been proposed to improve the supply in the old city by the increased pressure from the Corinthian basin, which is 25 feet higher than Fairmount, from which the present supply is obtained, and to supply the lower levees south of South street from Fairmount the mains necessary to accomplish this end are noted in detail the article on distribution.

The only valid objection that can be urged against increasing and improving the facilities for distributing the water is its scarcity.

For eight months of the year this objection does not exist, but for the remainder of the year the present insufficient distribution demands all the water that can be pumped with the available machinery.

THE PUMPAGE DIAGRAM.

The pumpage diagram shows graphically the daily rain-fall, the noonday temperature at Fairmount, the number of days (276) in which no water passed to waste over the flash boards, and the number of days (89) in which it did pass to waste; from which can be calculated the quantity available for power if stored at the head waters. It also shows the daily pumpage at each of the works and the total daily pumpage at all of the works, as well as the weekly average consumption.

THE PUMPING CAPACITY.

The table of pumping capacity accompanying this report should correct many erroneous impressions as to the great amount of power at the command of the Department, many failing to discriminate between the capacity of the pumps and the pumping capacity.

TELEGRAPH.

The number of messages sent from this office by Telegraph was 2,782. The number received was 2,758 making a total of 5,540. Of these 200 were in reference to leaks and breaks.

RECEIPTS AND EXPENDITURES

—OF THE—

Water Department

—FOR—

1879.

RECEIPTS.

Receipts of the Department and sources whence derived, as exhibited by statement of W. M. Taylor, Registrar, -	$1,416,359 13
Receipts at Chief Engineer's office, as per statement, - -	2,819 94
	$1,419,179 07

RECEIPTS AT CHIEF ENGINEER'S OFFICE FOR 1879.

For old iron, - - - - - - - -	$402 85
For rents, - - - - - - - - -	960 00
For brass scraps and turnings, - - - - - -	150 23
For waste rubber, - - - - - - - -	25 00
For old barrels, - - - - - - - -	33 00
Rice and bean attachment, - - - - - - -	81 30
Bergdoll & Co., - - - - - - - -	33 24
Pennsylvania Rail Road Co., - - - - - -	109 94
W. C. Allison, repairs, - - - - - - -	1 75
United States Mint, attachment, - - - - - -	63 18
North Penna. Railroad, " - - - - - -	33 93
I. & B. Allen, - " - - - - - -	106 44
Department of Prisons, " - - - - - -	70 31
Jas. Smith, - - " - - - - -	124 49
Erie & Western Transportation Co., attachment, - - -	67 45
Buckeye Mills, " - - -	11 80
West Spruce Street Presbyterian Church, attach. for motor, -	88 95
Holy Trinity Episcopal, do. do. - -	70 62
Oxford Presbyterian Church, - - - - - -	63 76
Young, builder, repairs, - - - - - - -	33 91
Becker & Co., attachment, - - - - - - -	98 89
Oxford Market Co., " - - - - - - -	101 51
Young America Cricket Club, attachment, - - - -	87 39
	$2,819 94

Receipts and Expenditures since Consolidation.

Years.	RECEIPTS.					EXPENDITURES.				Annual profits.
	REGISTRAR'S OFFICE.		At Chief Engineer's Office.	Totals.	Yearly increase of receipts.	From annual appropriation.	From special appropriation.	From loans for construction.	Totals.	
	For water rents.	For pipe laid.								
1855...	$360,059 16	$21,351 01	$626 55	$382,036 72	.....	$168,765 22	$82,130 15	.....	$250,895 37	$131,141 35
1856...	320,013 88	41,322 61	960 11	352,896 60	Decrease.	139,293 60	21,174 42	.....	160,468 02	192,428 58
1857...	395,288 36	30,383 58	302 20	425,964 14	$73,067 54	177,459 93	23,145 96	.....	200,605 89	225,358 25
1858...	420,372 57	37,145 91	129 75	457,648 23	31,684 09	175,016 86	12,961 23	.....	187,978 09	269,670 14
1859...	484,879 06	63,249 13	3,051 89	551,180 08	93,531 85	194,828 44	30,258 59	$186,650 06	411,737 09	316,093 05
1860...	494,824 22	62,297 54	1,409 77	558,531 53	5,941 65	193,528 64	4,767,74	54,209 85	252,506 23	360,235 15
1861...	498,599 40	34,495 36	855 30	533,980 06	Decrease.	161,277 58	1,447 36	76,261 60	238,989 54	371,255 12
1862...	516,602 94	28,164 31	1,025 82	545,793 07	11,813 01	156,023 43	21,099 81	40,842 94	217,966 18	368,669 83
1863...	538,025 58	30,715 02	937 69	569,678 29	23,885 22	187,486 49	23,273 43	2,989 28	213,749 20	358,918 37
1864...	586,978 71	22,278 57	855 29	610,112 57	40,434 28	251,831 13	21,325 68	.....	273,156 81	336,955 76
1865...	595,746 40	34,141 07	6,500 95	636,388 42	26,275 85	270,404 83	13,857 80	138,074 95	422,337 58	352,125 79
1866...	634,263 84	32,031 11	3,927 18	670 222 13	33,833 71	273,606 24	4,552 93	338,553 75	616,712 92	392,062 96
1867...	684,621 06	76,938 39	5,891 44	767,150 89	97,228 76	322,935 30	37,584 24	215,324 95	575,844 49	406 931 35
1868...	707,646 73	64 959 03	4,404 83	777,009 59	9,558 70	301,595 23	86,777 44	413,844 79	802,217 46	388,637 92
1869...	747,443 17	61,065 06	4,962 60	813,470 83	36,461 24	388,742 15	52,499 47	468,526 66	909,768 28	372,229 21
1870...	810,716 83	117,319 12	7,335 01	935 370 96	121,900 13	445,947 54	2,657 29	695,468 68	1,144,073 51	486,766 13
1871...	859,939 06	96,110,98	7,184 04	963,234 08	27,863 12	439,406 38	5,857 85	623.929 20	1,069,193 43	517,969 85
1872...	911,790 15	131 822 96	10 668 40	1.054,281 51	91.047 43	471,219 80	10,218 35	582,138 13	1,063,576 28	572,843 36
1873...	961,296 78	116,997 17	4,691 06	1.082,985 01	28,703 50	532,686 89	1,663 56	1,030,068 03	1,564,418 48	548 634 56
1874...	1,023,989 81	198,896 99	6,994 58	1,229,881 38	146,896 37	689,506 89	1,018 92	534,576 27	1,225.102 08	539,355 57
1875...	1,037,086 61	123,258 53	9,321 13	1,169,666 28	Decrease.	674,693 51	35.139 56	228,503 67	938,336 74	459,833 21
1876...	1,079,025 72	115,034 27	5,694 98	1,199,754 97	30,088 69	713,518 02	11,129 83	376,375 96	1,101,023 81	475,107 12
1877...	1,148,090 93	73,253 88	6,636 29	1,227,981 10	28,226 13	484,613 87	3,058 18	183,177 83	670,849 88	740,309 05
1878...	1,317,028 67	55,631 89	3,871 49	1,376,532 05	148,550 95	414,955 45	3,746 31	62,989 4[illegible]	481,691 16	894,840 89
1879...	1,385,123 21	31,235 92	2,819 94	1,419,179 07	42,647 02	438,884 72	4,808 96	.....	443,693 68	975,485 39
Total	$18,519,452 85	$1,690,689 41	$101,088 30	$20,311,230 56	.....	$8,668,228 14	$516,155 06	$6,252,509 00	$15,436,892 20	$11,063,857 96

EXPENDITURES OF THE DEPARTMENT FOR 1879.

From Annual Appropriation.

Salaries of Chief Engineer, Assistants, Purveyors, and Clerks,		$28,395 00
" Engineers, Firemen, etc., at Works,		57,105 00
" Registrar and Clerks,		25,590 00
Stationery, advertising, and office expenses,		6,999 82
One large fire-proof,		1,200 00
Supplies to Works:		
Coal and wood,	$69,999 21	
Tallow and oil,	3,497 77	
Gas,	4,993 55	
Small stores, packing, &c.,	2,999 58	
		81,490 11
Repairs to works:		
Fairmount,	$8,233 46	
Schuylkill,	2,881 71	
Belmont,	1,306 64	
Roxborough,	1,203 54	
Frankford,	930 33	
Delaware,	811 18	
Reconstruction of Turbine Wheel,	4,622 05	
		19,988 91
For drilling and making new attachments:		
Wages, First District,	$1,392 50	
" Second "	2,336 37	
" Third "	2,453 00	
" Fourth "	2,457 50	
" Manayunk	1,087 75	
" Germantown	272 50	
		9,999 62
For keeping pipes, plugs, stops, and fixtures, in good order:		
Wages, First District,	$2,782 00	
" Second "	3,742 13	
" Third "	7,573 25	
" Fourth "	5,014 37	
" Manayunk	1,692 50	
" Germantown	1,982 00	
" Pressure Inspector	866 25	
Paving around plugs,	1,094 05	
Covering steam pipe,	86 68	
Plumbing,	5 50	
Sundries,	4 70	
		24,843 43
Amount carried forward,		$255,611 89

Amount brought forward, - - -		$255,611 89
For labor in laying pipes, setting and fitting plugs, stop-cocks, &c.:		
Wages, First District, - -	$4,638 25	
" Second " - - -	8,388 37	
" Third " - - -	11,294 00	
" Fourth " - - -	18,824 50	
" Manayunk, - - -	3,610 00	
" Germantown, - - -	184 50	
" Shop, - - - -	21,124 26	
" Fairmount, - - -	3,034 26	
" Assistant Engineers, - -	5,549 50	
Measuring over pipe, - - -	858 78	
Hauling, - - - -	2,594 17	
Inspecting pipe, - - -	764 93	
Machine work, - - - -	27 64	
Oil, - - - - -	47 03	
Plumbing, - - - -	30 68	
Tubing, - - - -	8 42	
Damages by blasting, - - -	3 18	
		80,982 47
For keeping buildings, grounds, and reservoirs in good order:		
Wages, - - - - -	$23,665 14	
Laying track, - - - -	1,573 73	
Hardware, - - - -	698 12	
Lumber, - - - - -	610 55	
Machine work, - - - -	394 09	
Repairs to track, - - -	385 46	
Seeds and plants, - - -	379 65	
Hoisting blocks, - - -	294 74	
Hauling, - - - -	285 16	
Plumbing, - - - -	211 19	
Copper pipe, - - - -	198 50	
Scales, - - - - -	195 15	
Repairs to stand pipe, - - -	189 50	
Heaters and repairs, - - -	133 55	
Cement, - - - - -	113 65	
Hoisting machine, - - -	91 20	
Felt roofing, - - - -	67 07	
Lime, - - - - -	51 18	
Gauges, - - - - -	52 00	
Repairs to Delaware Pumping Station, -	50 00	
Moving iron safes, - - -	50 00	
Cotton waste and rope, - -	48 37	
Globes, - - - - -	44 88	
Testing scales, - - - -	34 00	
Amounts carried forward, -	$29,816 88	$336,594 36

Amounts brought forward, -	$29,816 88	$336,594 36
Boat, - - - - -	28 50	
Bricks, - - - - -	24 75	
Gum goods, - - - -	21 59	
Wire work, - - - -	21 50	
Stone, - - - - -	19 65	
Reflectors, - - - -	15 00	
Tolls, - - - - -	14 31	
Repairs to office, - - - -	11 85	
Iron brackets, - - - -	5 13	
Poles, - - - - -	5 00	
Salt hay, - - - -	4 88	
Gas pipe, - - - -	1 64	
		29,990 68

For purchase of iron pipes, fire plugs, stop cocks, lead, brass and iron castings, etc.

Iron pipe, - - - - -	$42,155 91	
Iron castings, - - - -	5,773 24	
Lead, - - - - -	5,461 60	
Brass castings, - - -	2,906 25	
Hardware, - - - - -	2,168 17	
Iron and steel, - - - -	1,518 56	
Lumber, - - - - -	1,759 25	
Plug valves - - - - -	1,153 50	
Packing, - - - - -	607 15	
Coal, - - - - -	626 70	
Plumbing, - - - - -	552 17	
Oil, - - - - -	396 49	
Gum goods, - - - - -	306 95	
Ice, - - - - -	295 10	
Water meter, - - - -	284 00	
Tubing, - - - - -	259 44	
Patent valves, - - - -	184 00	
Galvanizing, - - - -	167 27	
Wood, - - - - -	120 00	
Repairs to sewer, - - - -	106 00	
Gasket, - - - - -	94 50	
Malleable castings, - - - -	92 01	
Rent, - - - - -	75 00	
Machine work, - - - -	65 00	
Coke, - - - - -	51 40	
Repairs to roof, - - - -	44 80	
Pump for engine, - - - -	40 00	
Hauling, - - - - -	33 00	
Gauges, - - - - -	16 00	
Amounts carried forward, -	$67,313 46	$366,585 04

Amounts brought forward,	$67,313 46	$366,585 04
Powder,	19 00	
Pumps,	16 50	
Repairing tools,	12 95	
Map,	10 00	
Repairs to wheelbarrow,	9 70	
" " tool-house,	9 50	
" " pump,	9 00	
" " gauges,	8 85	
Steel castings,	8 64	
Damages,	5 00	
Transportation,	5 00	
Repairing tools,	3 15	
Adjusting scale,	2 50	
		67,433 25
For carriage, hire, and keep of horse, for Superintendent and Assistant Engineers,		$750 00
For carriage-hire, and keep of horse for Chief Engineer,		650 00
For care and maintenance of the Chestnut Hill Works,		2,497 39
For expenses of public fountains of the Philadelphia Fountain Society		$969 04
		438,884 72

EXTRA APPROPRIATION.

(Approved November 25th, 1879.)

For the purpose of meeting certain deficiencies in the annual appropriation, as follows:

To item 11, for books and stationery,	$2,000 00	
" 13, for coal and wood,	10,000 00	
" 14, for tallow and oil,	1,500 00	
" 20, for labor in laying pipes,	6,000 00	
" 22, for the purchase of iron pipe,	7,500 00	
Total,	$27,000 00	
Expended,		$26,782 20

SPECIAL APPROPRIATIONS.

(Approved Oct. 12th, 1875.)

For new boilers, settings, and connections, at Chestnut Hill Works; for relining south division of the Roxborough Reservoir; for repairing the Wissahickon Aqueduct; to extend the ten-inch main on Ridge Avenue; and for the purchase of a lot of ground on the Roxborough Ridge at Manatawna:	
Wages - - - - - - - -	$954 00

(Appropriation Approved July 1st, 1879.)

To refund twice-paid and over-paid water-rents, and and pipe-laying bills, - - - -	2,444 37

(Appropriation Approved December 13th, 1879.)

To refund twice-paid and over-paid water-rents and pipe-laying bills, - - - - -	1,410 59

EXTENSION OF WORKS.

Balances of loans consolidated Dec. 31, 1878, but no appropriations made therefrom:

RECAPITULATION.

Expended from annual appropriation, - - -		$412,102 52
" " extra " - - - -		26,782 20
" " special " - - - -		4,808 96
" " loans (extension works), - - -		
Total expenditures for 1879, - - - - -		$443,693 68
Receipts at office of Register, - -	$1,416,359 13	
" " " " Chief Engineer, -	2,819 94	
	$1,419,179 07	
Expended as per annual extra and special appropriations, - - -	443,693 68	
Profits, - - - - -	$975,485 39	
Amount collected by City Solicitor, -	46,445 94	
Revenue in excess of expenditures, -	$1,021,931 33	

OPERATIONS

—OF THE—

REGISTRAR'S DEPARTMENT

—FOR—

1879.

Department for Supplying the City with Water.

Registrar's Office,
N. W. cor. Thirteenth and Spring Garden sts.

Philadelphia, January 1st, 1880.

Dr. Wm. H. McFadden,
Chief Engineer.

Dear Sir:—I herewith transmit the report of receipts at this office for the year 1879. The total amount derived from all sources was $1,416,359.13, which has been paid daily, as received, into the office of the City Treasurer. This is an increase over the previous year of $43,698.57.

The collections from water-rents for the year 1879 amounted to $1,186,001.69, an increase over the previous year of $100,163.28, and the receipts from delinquent rents amount to $118,234.15, a decrease of $17,889.78.

The receipts from fractional rents, penalties and other sources amounted to $80,887.37, a decrease of $14,178.96.

The receipts from water-pipe amounted to $31,235.92, a decrease of $24,395.97.

Pipe bills to the amount of $22,895.61 were returned to the City Solicitor for lien, and the amount collected by him was $46,-445.94, as appears of record in that department.

Respectfully referring to the annexed itemized tables, I remain,

Yours, very respectfully,

Wm. M. Taylor,
Registrar.

Receipts at the Registrar's office for the year 1879.

MONTHS.	Delinquent rents.	Penalties.	Rents of 1879.	Penalties.	Fractional rents.	Water pipe.	Total.
January	$5,216 85	$776 10	$35,865 06	.....	$1,888 04	$1,200 86	$44,946 91
February	3,399 75	504 88	78,853 52	.....	734 84	6,846 15	90,339 14
March	4,953 25	723 57	215,879 92	.....	3,205 69	1,135 22	225,897 65
April	19,669 75	2,825 62	616,548 83	.....	3,528 30	1,764 14	644,336 64
May	12,954 00	1,931 78	58,729 78	2,811 89	8,376 26	1,818 50	86,662 21
June	23,202 65	3,413 82	66,091 45	3,288 52	3,814 20	2,832 24	102,642 88
July	17,506 35	2,604 86	14,814 55	2,208 75	3,936 20	2,065 08	43,133 79
August	13,558 00	2,028 89	17,142 75	2,534 17	2,915 54	1,811 91	39,991 26
September	7,682 55	1,135 72	53,617 00	7,872 66	3,726 20	4,670 07	78,704 20
October	5,429 00	809 59	16,918 08	2,503 47	3,870 67	2,272 55	31,803 36
November	3,034 00	449 19	5,759 50	856 36	3,513 10	2,561 72	16,173 87
December	1,628 00	235 34	5,777 25	861 49	1,007 66	2,557 48	11,767 22
Totals	$118,234 15	$17,439 36	$1,186,001 69	$22,931 31	$40,516 70	$31,235 92	$1,416,359 13

Amount of claims for water pipe returned for lien in 1879.....$22,895 61.

Amount of claims for water pipe collected by City Solicitor in 1879.....$46,445 94.

Comparative statement of receipts for the years 1878 *and* 1879.

	Delinquent Rents.	Penalties.	Water Rents.	Penalties.	Fractional Rents.	Water pipe.	Totals.
1879	$118,234 15	$17,439 36	$1,186,001 69	$22,931 31	$40,516 70	$31,235 92	$1,416,359 13
1878	136,123 93	19,759 24	1,085,838 41	25,915 19	49,391 90	55,631 89	1,372,660 56
Increase			$100,163 28				$43,798 57
Decrease	$17,889 78	$2,319 88		$2,983 88	$8,875 20	$24,395 97	

Items of receipts under head of "Fractional Rents."

	Rents.	Ferrules.	Re-paving.	Repairs.	Totals.
1879	$27,606 20	$5,890 00	$4,678 25	$2,342 25	$40,516 70
1878	35,136 14	7,008 00	5,823 50	1,424 26	49,391 90
Increase				$917 99	
Decrease	$7,529 94	$1,118 00	$1,145 25		$8,875 20

Estimated receipts in statement to City Controller	$1,350,000 00
Actual receipts as above	1,416,359 13
Increase over estimate	$66,359 13

List of Dwellings, Factories, Horse-power, etc, charged on Registers for 1879.

	WARDS.																													Totals.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Baths	3056	1110	947	595	696	390	2479	2304	1791	2152	403	884	1412	2023	4441	650	526	1224	3598	5654	480	1833	398	3911	1184	2422	1827	3736	5535	2438	1941	62,043
Bakeries	55	38	36	37	33	20	26	30	23	37	29	29	27	44	32	39	33	40	62	74	9	13	7	27	29	42	7	21	49	50	49	1,047
Banks					5	15		3					2	1				1	1	1			1				2				32
Bars	164	153	187	190	406	230	84	143	341	152	187	131	119	132	215	140	143	152	263	201	71	47	51	144	136	121	71	109	139	114	164	4,900
Barber shops	37	32	18	18	39	41	25	24	35	16	20	14	28	31	39	25	24	25	42	41	10	9	5	29	15	14	12	19	26	24	29	766
Biddets						2	2	94	18	11					14					13		6		4			2		8			174
Billiard saloons								1												2				1						13		4
Blacksm'h shops	1		14	14	3	5		12	9	5	8	7	4	16	11	14			25	27			6	18	15	13	3				17	260
Bleach'g establ'ts		1																		1												2
Bottling	1	4		2	3	3				2		4		1	4		3	4	10	3	1				3			3	2	2	1	56
Boarders					69	230		500	600	330	100	103	32							45												2,009
Boilers	53	26	12	4		227	30	57	92	33	77	33	30	44	131	102	80	69	169	58	21	57	30	26	59	37	36	23	42	44	107	1,809
Breweries & dis's		1	2	1	1	2			1		8	3	2		3		11	1	10	9		1	1	1	5	1		7	14			85
Brickyards							1											9	1	1	1				2	1		10	1	1		28
Carriages	26	60	55	73	42	33	48	206	217	333	28	214	312	209	361	52	81	120	112	311	24	302	114	115	42	38	162	176	131	74	62	4,133
Carpenter shops	2	1	9	14	6	2	6	9	6		3	4	10	22	14	13	6		6	17			1	1	4	3	8			5	3	175
Car shops		1								1																					2	4
Cars	9												81	30	117			59	66					191			53			55	111	772
Chemical works													1												1							2
Churches	11	9	7	7	5	8	2	9	7	4		2	8	16	16	3	2	3	13	16	8	6	9	23	12	9	13	7	19	4	6	264
Children Homes															2									1			8					6
Coal yards	4	22	2	3				1					9	4	8			1	10	11	5		2	1	3		7	6		5		104
Cooper shops			2			2					6							1	3													14
Coffee roasters	2	1	1																2	2												8
Depots	1	1									4		1	1	5				2				1	4	2		3	4	1	2	2	34
Droveyards																		1	1					2								4
Drug stores	21	15	15	9	11	7	20	18	9	21	5	13	17	14	21	6	11	12	27	29	7	8	7	27	9	17	9	23	27	16	16	467
Dwell's & hydra's	7642	4305	2397	2310	2776	2820	4580	2930	2482	3540	1751	1975	2921	3494	7157	2383	2388	3974	6771	7554	2379	2784	2590	7307	4866	6224	2469	5044	7391	5093	5709	128006
¾	33	64	28	34	15	16	27	48	79	27	16	21	17	46	135	93	120	202	56	74	20		1	19	48	7	17	20	53	2	366	1,704
½	227	1166	1113	1112	549	295	785	448	149	823	785	710	492	482	717	1080	1187	682	276	403	14	14	49	42	20	91	43	29	28	252	113	14,361
Dye houses		1	1		7	6	3	3		3	15		4	1	4	3	10	3	16	4	4	5	2	1	9			2		3	13	123
Dye vats					52									2	20	11		10			7	32						3				137
Eating saloons and restaurants			1			45	5	3	28	16	25		1	5	1	16		1	5	3			1	7		7	8			4	4	186
Engines	51	21	11	3	56	192	1	8	2	3	1	4	36	39	85	40	39	50	131	42	11	47	30	19	48	25	31	19	25	42	78	1,190

List of Dwellings, etc.—Continued.

	WARDS.																													Totals.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Engine houses	1	.....	.....	.....	1	1	1	1	1	1	1	1	.....	1	2	.....	.....	.....	2	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	16
Factories	4	.....	2	1	1	9	.....	....	2	26	52	.....	7	47	47	53	26	10	44	43	22	34	19	4	19	12	13	10	14	13	14	548
Feed stores	3	3	.....	6	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	13	.....	.....	.....	1	5	.....	.....	.....	.....	.....	6	5	48
Fire plugs	.....	2	2	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	12
Fish stands	.....	.....	1	1	2	.....	1	6	6	.....	4	.....	.....	1	6	.....	.....	.....	2	5	2	.....	.....	4	.....	.....	2	.....	.....	2	1	41
Firebrick works	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Foot baths	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	6	.....	.....	.....	.....	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10
Foundries	5	1	.....	.....	7	3	.....	.....	.....	.....	.....	.....	.....	5	29	1	1	.....	8	11	.....	.....	2	.....	1	2	1	.....	.....	2	2	81
Fountains	8	2	4	.....	.....	10	8	30	23	15	2	7	3	16	16	5	.....	6	4	16	5	24	4	33	4	4	37	14	27	17	3	246
Forges	4	3	8	20	3	11	3	6	4	34	28	2	19	31	52	30	19	151	20	54	.....	.....	10	3	17	15	3	.....	.....	27	26	603
Furnaces	4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4
Galvaniz'g w'rks	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Gas works	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	2	.....	.....	.....	.....	1	.....	6
Glass works	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	3	7
Green houses	14	.....	.....	.....	.....	.....	.....	12	4	2	.....	.....	2	2	6	.....	.....	7	5	7	15	50	15	24	45	8	46	68	14	12	1	359
Grindstones	.....	.....	.....	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	.....	10	30	.....	.....	17	.....	.....	.....	1	.....	5	.....	2	.....	.....	.....	.....	70
Hatter's planks	.....	.....	2	.....	12	19	.....	.....	2	2	.....	.....	.....	3	.....	21	.....	.....	17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	78
Halls	3	.....	2	1	.....	2	.....	2	2	.....	.....	.....	.....	1	1	.....	.....	1	.....	3	.....	.....	2	1	.....	1	1	.....	.....	6	1	30
Haymarkets	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Horse troughs	27	11	14	4	17	7	6	4	6	7	8	10	4	8	22	5	14	33	40	28	11	11	6	51	28	11	12	25	9	15	30	484
H'se-pwr of bol'rs	539	729	165	332	1284	2770	381	710	1213	887	728	264	571	1007	2745	1775	1090	1287	2974	1052	335	.....	713	293	777	727	592	176	.....	750	1878	28,744
Hotels	.....	.....	.....	.....	.....	7	.....	.....	11	1	4	.....	1	.....	.....	.....	.....	.....	.....	3	.....	.....	.....	6	.....	.....	3	.....	.....	.....	.....	36
Hospitals	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	2	.....	5	1	.....	1	.....	3	.....	.....	13
Ice cream saloons	2	7	9	2	3	.....	23	.....	14	.....	10	.....	10	.....	12	5	2	1	.....	10	.....	.....	.....	10	.....	1	1	6	5	1	1	135
Kitchens	.....	.....	.....	.....	.....	.....	.....	.....	8	2	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15
Laboratories	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	1	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	.....	6
Laundries	.....	1	.....	.....	5	3	.....	13	13	8	.....	3	5	5	3	.....	.....	.....	.....	6	.....	4	.....	1	.....	.....	2	2	3	2	.....	79
Lime vats	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	36	.....	.....	.....	66	60	.....	10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	172
Lime yards	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
Lumber yards	2	1	.....	.....	.....	1	1	.....	4	.....	.....	.....	1	1	2	.....	1	.....	3	.....	.....	.....	1	1	.....	.....	1	.....	.....	2	1	23
Machine shops	.....	.....	.....	.....	.....	1	.....	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	4	6	.....	.....	.....	6	1	2	5	3	.....	.....	4	3	37
M'rble yd & st'res	1	1	1	.....	.....	1	4	5	6	4	.....	.....	3	7	1	2	2	2	7	4	.....	.....	.....	5	.....	6	.....	5	.....	6	2	75
Market stalls	.....	.....	629	52	629	.....	.....	77	1263	.....	602	.....	19	148	495	.....	.....	.....	39	288	50	.....	.....	326	.....	.....	2	.....	885	342	50	5,896
Market houses	.....	.....	2	2	2	2	1	1	3	.....	3	.....	.....	1	4	.....	.....	.....	1	3	1	.....	.....	4	.....	1	2	.....	3	3	1	39
Malt houses	.....	.....	.....	.....	1	1	.....	1	3	.....	.....	.....	1	.....	1	.....	.....	1	4	3	.....	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	18
Mills	2	3	1	.....	1	3	1	.....	.....	2	2	.....	.....	.....	.....	.....	.....	2	1	.....	.....	.....	9	5	1	4	6	.....	.....	.....	1	44

List of Dwellings, etc.—Continued.

	WARDS.																													Totals.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Offices	8										15				5			5	10	25		2	7	24	8	5	21	20	12		2	169
Openings																																
Oyster houses	3	1		19	22	5						5		4			7	3	17		2			1		2		4			95
Paint shops								2																							2	4
Paper factories								1													1				1		1					3
Photo galleries		1	1	1	6		5	8	15	5	7		6	3	2		2	1	1	3	3	1	1		1		1	1			1	76
Polishing wheels						3	1							2																		6
Pools	2				1			1	1	3			1	1	6	1				4			1		2						1	25
Potteries	1																		2												2	5
Printing offices					1	2		2	9	2									1				1									18
Rectify'g estab'lts							1		3																							4
Roofing estab'lts				1																												1
Schools	3	1	2	2	4	3	8	12	9	7	3	6	4	9	7	4	3	8	9	9	6	9	6		8		9	6	11	2	5	175
Scholars	1320		1859	600	100	115	3354	1899	1581	3552	1431	2023	50	235	700	2083	1500	4910	4530	360	1662	2455	1976		2377		534	2000	3746	1730	3900	52,582
Scouring estab'lts												1			2				1												4	8
Shower baths								26		1			162	4	429	1			1	38	7		1	2			40	19	124	1		856
Shot towers		1																														1
Shoe factories							1																									1
Sinks	4	2		4	29	176	116	701	121	83	26	10	24	22	137				4	81	9	160	1	120		36	304	38	71	26		2,305
Skin dress'g estab				1												2	6		4													13
Slaughter houses	45	1								1	2	1	4	14	15	8	57	17	66	14			4	47	21	4		71	18	2	45	457
Soap factories	2		1		1	1	1						1		2				2	2					1			2				16
Stables	113	60	71	79	47	45	149	189	83	157	86	76	55	123	223	61	171	69	93	235			108	294	37	128	62			106	134	3,055
Stalls	1034	738	403	667	245	840	598	566	1104	853	569	625	735	877	1894	680	730	1520	1320	1844	356	1083	562	2632	584	1084	1410	2026	1652	953	935	31,119
Steam heaters					21	28		4	4				3	4	7										2							73
Steam saws						2		5		2				4					1									2				16
Stills									1	2																						3
Stores and shops	23	24	2	14	6	34			5			11	9	65		2	26	24	93	27	7	16	23	59	27	6	33	28	26	27	108	725
Store houses			2	9		9														4												24
Sugar houses	2	2	2	2		2								1																		11
Tanneries											16					4	5		1													26
Theatre and op'ra houses						2		2	1	1				1																		7
Tin shops																																
Turbine wheels (organs)								1						1		1	1				1	1		1					1			8

List of Dwellings, etc.—Concluded.

	WARDS.																													Totals.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Tubs, vats & tanks	15	14	22	3	215	104	303	927	192	133	82	121	236	8	37	130	180	10	76	319	.....	.....	3	237	47	37	401	.....	.....	62	128	4,042
Type foundries	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Urinals	7	6	4	221	240	310	22	308	211	13	14	13	27	45	47	12	10	4	33	22	9	13	.....	59	.....	2	35	17	30	27	2	1,763
Vinegar factories	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	1	.....	.....	1	.....	.....	.....	1	.....	.....	.....	1	6
Warehouses	.....	.....	.....	1	.....	.....	1	.....	3	.....	9	.....	5	4	.....	.....	2	1	3	.....	.....	.....	.....	.....	.....	.....	2	.....	.....	1	.....	32
Wash paves	1149	586	513	75	563	423	1410	1165	1954	1521	329	613	1171	1430	3104	414	497	1021	2102	4097	365	1016	468	2194	516	978	1373	3029	1447	1603	1145	41,271
Wash basins	68	49	82	72	1374	2672	1213	2654	2011	1633	296	927	831	757	3078	150	105	105	308	1955	186	763	90	1593	55	135	1622	1913	3459	164	104	30,424
Wash tubs	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	170	81	560	.....	.....	.....	15	24	14	367	12	.....	.....	.....	.....	75	559	.....	.....	1,877
Water closets	69	63	132	87	1451	2376	1577	3278	1861	1496	153	568	1201	997	2929	150	111	73	263	2129	149	1261	52	2219	15	178	2087	2398	3045	613	135	33,116
Wire factories	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
Wool washers	.....	2	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	3	9

Permits issued during the year 1879.

	WARDS.																													Totals.
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Dwellings	93	7	4	13	5	6	6	14	6	17	2	1	7	3	39	8	12	51	72	81	169	149	76	297	221	270	92	267	294	25	60	2367
" ½ and ¾																		6	4	1		1										12
Baths	93	10	1	4	3	3	15	34	13	10	5	3	11	7	43	5	12	31	57	74	34	90	20	226	77	129	73	236	255	29	38	1641
Wash paves	39	3	.....	3	4	5	3	18	14	3	.....	4	7	4	34	3	9	19	32	67	14	27	14	89	18	54	81	158	127	20	24	897
Water closets, urinals & biddets	11	1	1	1	31	113	22	72	73	17	16	7	29	12	57	3	12	2	32	91	11	58	5	133	2	18	178	179	165	19	25	1396
Basins, sinks and wash tubs	3	.....	.....	4	26	64	16	83	50	6	2	4	15	3	42	1	6	2	20	45	13	38	9	87	.....	5	177	182	148	14	3	1068
Bars	3	1	.....	.....	3	2	1	1	.....	7	5	1	1	3	8	.....	1	5	3	8	7	3	1	1	2	6	.....	2	3	1	4	83
Watering horses	2	1	.....	.....	1	.....	1	.....	1	2	.....	1	.....	3	1	1	.....	3	.....	4	2	3	.....	1	1	2	.....	1	1	.....	2	34
Stables	2	1	.....	.....	.....	.....	.....	.....	1	3	.....	.....	.....	.....	2	.....	.....	3	3	5	7	3	1	4	2	2	1	3	3	3	5	54
Slaughter houses	2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1	1	1	.....	.....	1	.....	.....	1	8
Factories	2	.....	.....	.....	.....	2	.....	1	.....	.....	3	3	.....	.....	2	3	2	1	17	.....	.....	1	1	.....	2	.....	2	1	1	.....	11	55
Boilers and engines	5	.....	.....	.....	3	10	.....	2	4	2	4	1	1	4	3	6	3	1	11	3	1	4	1	2	5	1	2	4	3	.....	9	95
Horse powers	53	.....	.....	.....	25	139	.....	50	70	26	99	15	3	16	33	178	80	50	331	47	1	31	8	7	145	2	26	49	31	.....	203	1718
Stores, shops and offices	3	1	2	.....	6	11	2	.....	11	.....	15	.....	5	3	2	2	.....	1	3	3	3	5	1	3	2	3	1	6	4	2	3	103
Hotels and restaurants	.....	.....	.....	.....	.....	1	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2
Fountains	.....	.....	.....	.....	.....	.....	.....	1	2	.....	.....	1	.....	2	.....	.....	.....	.....	1	.....	1	.....	1	.....	.....	.....	.....	1	1	.....	1	12
Breweries & btlg establishments	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	3
Bakeries	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	3	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	2	.....	.....	8
Hot and green houses	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	7	6	.....	.....	.....	.....	.....	.....	15
Laundries	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	1
Institutions, churches	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	1	1	.....	3
Building purposes	1	.....	.....	1	2	2	2	1	4	1	3	1	1	3	4	2	2	5	21	8	38	35	10	26	32	7	18	29	23	9	17	308
Water for ships	.....	68	1	.....	.....	1	.....	.....	.....	.....	13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	83
Sprinkling streets, etc	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35
Total	312	93	9	26	109	359	68	277	250	94	168	42	81	63	270	215	139	180	608	437	302	450	151	885	516	499	652	1120	1062	123	406	10001

Amount of Duplicates for the Years 1879 *and* 1880.

Wards.	January, 1879	January, 1880
First	$61,803 40	$62,230 75
Second	36,955 75	36,856 75
Third	21,185 48	22,011 73
Fourth	22,154 25	22,239 75
Fifth	34,937 75	34,684 75
Sixth	44,233 58	46,691 78
Seventh	44,453 37	44,701 81
Eighth	46,976 95	46,982 67
Ninth	37,747 10	37,710 05
Tenth	41,026 65	41,112 25
Eleventh	20,185 25	21,387 35
Twelfth	22,472 10	22,526 20
Thirteenth	34,237 29	34,408 79
Fourteenth	38,528 80	38,590 75
Fifteenth	90,308 50	90,837 30
Sixteenth	27,854 65	28,443 85
Seventeenth	27,332 70	27,988 13
Eighteenth	40,536 68	41,481 23
Nineteenth	73,146 38	74,449 13
Twentieth	82,901 80	84,605 80
Twenty-first	17,099 95	18,920 70
Twenty-second	30,662 30	31,967 35
Twenty-third	18,166 75	19,352 75
Twenty-fourth	64,779 50	67,422 20
Twenty-fifth	34,113 15	36,303 84
Twenty-sixth	45,194 50	47,641 00
Twenty-seventh	30,744 27	31,250 91
Twenty-eighth	51,835 10	56,145 60
Twenty-ninth	79,936 53	82,887 95
Thirtieth	46,410 80	46,307 80
Thirty-first	49,542 25	50,871 25
	$1,317,493 53	$1,349,022 17

Subject to revision by re-inspection.

Amounts collected for pipe frontage by the Registrar of the Water Department and the City Solicitor.

YEARS.	Feet of pipe laid.	Collected by Registrar.	Returned for lien.	Collected by City Solicitor.
1855	31,724	$21,035 76	$7,980 71	.....
1856	54,879	31,405 69	6,938 20	.....
1857	63,684	30,676 27	28,928 91	.....
1858	72,124	37,130 07	29,987 16	.....
1859	116,944	67,834 04	29,415 23	.....
1860	100,544	62,697 54	26,459 47	.....
1861	60,448	34,495 36	31,963 25	.....
1862	48,474	28,164 31	24,200 28	.....
1863	56,961	30,715 02	14,350 70	$16,544 21
1864	36,139	22,278 57	13,630 59	13,535 22
1865	46,994	34,141 07	11,970 42	7,564 68
1866	66,324	32,031 11	4,160 13	12,190 21
1867	84,171	76,938 39	22,830 11	7,892 28
1868	79,348	64,959 03	21,701 68	18,549 86
1869	118,044	61,065 06	24,866 43	16,389 90
1870	139,233	117 319 12	61,640 99	11,959 82
1871	158,972	96,110 98	62,341 24	14,764 47
1872	146,221	131,822 96	77,467 36	20,921 96
1873	210,736	116,997 17	75,822 09	26,601 71
1874	225,271	198,896 99	152,593 11	31,130 17
1875	179,388	123,258 53	122,533 39	65,870 28
1876	144,593	115,034 27	81,151 48	52,259 95
1877	84,624	73,253 88	38,581 54	56,233 57
1878	61,650	55,631 89	32,223 75	40,113 80
1879	41,613	31,235 92	26,895 71	46,445 94
Total	2,429,103	$1,695,129 00	$1,030,633 93	$458,968 03

City ordinance providing for payment of pipe frontage, passed Councils January 29th, 1855.

Purposes for which water is supplied free of charge.

WARDS.	City Property.				Fountains.			
	School houses.	Police stations.	Fire stations.	Other buildings.	Fountain society.	Society P. C. A.	Other Associations.	City.
First	8	1	1		1	1		
Second	7				2			
Third	6	1			2			
Fourth	5		1		2			
Fifth	5	2	2	2	11	1	1	
Sixth	2	1	1		5			1
Seventh	5	1	3		3			
Eighth	3	1			12			1
Ninth	3	1	1	1	8			
Tenth	5	1	1		1			
Eleventh	4	1	1					
Twelfth	6							
Thirteenth	3							1
Fourteenth	7	1	1	1	2			1
Fifteenth	6	1	2			1	3	
Sixteenth	4				1			
Seventeenth	3	1						
Eighteenth	8	1	1		2			
Nineteenth	8		1		3	1		2
Twentieth	7	1	1		2			
Twenty-first	4	1	2					
Twenty-second	7	2			1	1		
Twenty-third	5	1	2					
Twenty-fourth	10	1	1	2	7	1	1	1
Twenty-fifth	10	1	1					
Twenty-sixth	5		1	1	3			
Twenty-seventh	6	1	1	1	4	1		
Twenty-eighth	7	1						
Twenty-ninth	8	1	1		3			
Thirtieth	5	1			1			
Thirty-first	5	1						
Totals	177	26	26	8	76	7	5	7

The City properties, classed under the head of other buildings, are:

Independence Hall and Annexes, New Court House, New Public Buildings, Broad and Market streets; Spring Garden Hall, Park offices, Memorial Hall, Moyamensing Prison, and Philadelphia Almshouse. Water is also furnished, free of charge, for sprinkling Fairmount Park drives and supplying its fountains.

The following are the locations of fountains in Fairmount Park.

EAST OR OLD PARK.

Two (2) new fountains on Flat Iron.
Three (3), group of fountains near Brown street entrance.
Fish pond fountains near Brown street entrance.
Fountain in front of Art Gallery, near Green street entrance.
One drinking fountain near Lincoln Monument.
Two drinking fountains near Lemon Hill Mansion.
One drinking fountain near Grant's Cabin.
One drinking fountain at Sedgeley Guard House.

WEST PARK.

Catholic fountain, west end of Republic avenue.

One small drinking fountain on Lancaster drive, east side of Belmont.

One small drinking fountain, at Children's Play-ground, Sweet Briar.

Three small fountains at Horticultural Hall.
One inside the Hall in flower-bed.
Two in flower-beds outside of the Hall, west side.
Fountain in lake near Machinery Hall.

OPERATIONS

—OF THE—

WATER DEPARTMENT SHOP,

918 Cherry Street,

—FOR—

1879.

STOCK ACCOUNT.

Statement of the operations of Cherry street shop, from January 1, 1879, to December 31, 1879.

Dr.

To stock on hand January 1, 1879,	$13,112 98
379,527 lbs. iron castings,	6,598 24
10,570 " brass castings,	1,612 64
5,246½ " gum metal,	994 58
1,226½ " malleable castings,	92 01
3,074 " steel (assorted),	348 78
28,285 " wrought iron, (assorted),	700 70
124 tons coal,	544 10
9,593½ feet of lumber, (assorted),	389 90
8 cords wood,	60 00
Bolts and nuts,	1,259 78
Gum, rings, valves and assorted gum,	1,474 02
Wrought pipe and fittings,	120 89
Hardware,	1,088 84
Rope and gasket, 3,723 lbs.,	289 60
Sponge cloths,	419 75
Paints and oils,	652 66
Water meters (assorted),	284 00
Railroad tickets,	446 50
Machine work,	220 42
Cartage,	4 00
26,029 lbs. lead,	1,132 25
Wages paid hands	21,990 51
694 stop-boxes,	2,082 00
Plumbing,	2 37
Brooms and brushes,	8 05
Leather belting,	33 24
Gauges and repairs to same,	51 69
Brass fittings,	242 46
Wire work,	3 50
Galvanizing,	153 23
Incidentals,	7 08
3 Barton 4-way stops,	240 00
Old metals,	35 56
	$56,692 33
Balance,	17,157 02
	$73,849 35

Cr.

By repairs and supplies, First District, - - -		$2,983 52
" " " Second " - - - -		9,363 26
" " " Third " - - - -		5,563 52
" " " Fourth " - - - -		17,428 89
" " " Germantown, - - -		1,159 15
" " " Manayunk, - - -		1,106 45
" " " Building and Grounds, - -		82 53
" " " Fairmount Works, - - -		1,522 67
" " " Schuylkill Works, - - -		5,243 92
" " " Belmont Works, - - -		4,165 64
" " " Delaware Works. - - -		1,688 22
" " " Roxborough Works, - -		3,277 18
" " " Chestnut Hill Works, - -		1,210 13
" " " Frankford Works, - - -		1,804 86
" " " Frankford Reservoir, - -		60 64
" " " Water meters, - - -		1,845 36
" " " Main office, - - -		377 92
" " " Old metals, - - -		444 73
" " " Empty oil barrels, - - -		4 75
" " 2,715 ferrules, - - - -		1,348 50
Stock on hand, as per inventory, January 1, 1880, - -		13,167 51
		$73,849 35

INVENTORY OF STOCK ON HAND, JANUARY 1, 1880.

17	8-inch socket screws, at	$6 00	$102 00	
36	10-inch " "	6 50	234 00	
34	11-inch " "	7 00	238 00	
20	12-inch " "	8 00	160 00	
10	13-inch " "	8 00	80 00	
10	14-inch " "	8 00	80 00	
12	15-inch " "	9 00	108 00	
11	16-inch " "	9 00	99 00	
7	17-inch " "	10 00	70 00	
				$1,171 00
30	4-inch square-top screws, at	5 00	150 00	
6	8-inch " " "	6 50	39 00	
6	10-inch " " "	8 00	48 00	
5	12-inch " " "	10 00	50 00	
16	16-inch " " "	12 00	192 00	
8	20-inch " " "	14 00	112 00	
2	36-inch " " "	25 00	50 00	
				641 00
	Amount carried forward, - - -			$1,812 00

	Amount brought forward,			$1,812 00
21	4-inch new style screws,	at 5 00	105 00	
18	6-inch " " "	5 00	90 00	
12	8-inch " " "	7 00	84 00	
2	12-inch " " "	10 00	20 00	
2	30-inch " " "	20 00	40 00	
				339 00
11	4-inch spindles,	at 5 00	55 00	
24	6-inch " "	5 00	120 00	
11	10-inch " "	5 00	55 00	
14	12-inch " "	5 00	70 00	
				300 00
60	frames and covers,	at 6 00	360 00	
1	steam plug,	" 28 00	28 00	
2	steam plug cases,	" 7 50	15 00	
3½	doz. caulking and gasket irons,		31 50	
3½	" chisels with handles,		52 50	
13	" assorted chisels,		117 00	
				604 00
4½	doz. assorted drills,		54 00	
5	sledges,		20 00	
8	assorted reamers,	at 2 87	22 96	
56	plug monkeys complete,	" 6 00	336 00	
89	" " frames,	" 65	57 85	
19	" " screws,	" 3 28	62 32	
				553 13
5,032	lbs. unfinished brass castings,	" 15½	779 96	
2,907	" finished " "	" 35	1,017 45	
75	plug waste valves,	" 30	22 50	
321	assorted ferrules,	" 50	160 50	
2,730	feet lumber,		67 66	
8	4-inch stop-cocks,	" 22 00	176 00	
26	6-inch "	" 25 00	650 00	
4	8-inch "	" 55 00	220 00	
4	10-inch "	" 67 00	268 00	
3	16-inch "	" 100 45	301 35	
190	doz. sponge-cloths,	" 50	95 00	
				3,758 42
397	wood plugs,	at 50	198 50	
10	doz. pick-handles,	" 2 65	26 50	
33	" assorted "		41 97	
3	car-jacks,	" 12 00	36 00	
16	stop-boxes,	" 3 00	48 00	
3	3-inch water-meters,	" 175 00	525 00	
	Bolts and nuts,		386 38	
				1,262 35
	Amount carried forward,			$8,628 90

Amount brought forward,	-	-	-	$8,628 90
11,507 lbs. lead,	at	4 35	500 55	
Hardware,			179 67	
2 sets of gearing for derrick,			100 00	
Paints and oils,			118 36	
1,400 lbs. gasket,	"	7	98 00	
151 pure gum rings,	"	1 00	151 00	
478 " " plug valves,	"	1 90	908 20	
19 hammers,	"	1 00	19 00	
				2,074 78
96 lead rings,	at	50	48 00	
5,0561 lbs. iron castings,	"	1 59½	806 44	
Pipe and fittings,			30 00	
8,428 lbs. wrought iron (assorted)	"	2½	210 70	
294 " steel (assorted)	"	12	35 28	
				1,130 42
1 4-inch band,	"	4 00	4 00	
18 6-inch "	"	5 00	90 00	
35 8-inch "	"	6 00	210 00	
24 12-inch "	"	8 50	204 00	
10 16-inch "	"	9 50	95 00	
2 20-inch "	"	10 50	21 00	
1 30-inch "	"	25 00	25 00	
				649 00
68 cross heads complete			68 00	
Finished sides and valves (assorted)			328 96	
2035 lbs. forgings	at	10	203 50	
146 " malleable castings	"	7½	10 95	
80 brass plugs (assorted)	"	50	40 00	
15 plug nuts	"	1 00	15 00	
1 doz. picks			18 00	684 41
				$13,167 51

Stop cocks, stop cock boxes, frames and covers, fire plugs, cases, lead and gasket, delivered from shop, No. 918 *Cherry street, during* 1879.

DISTRICTS.	3-inch stop cock.	4-inch stop.	6-inch stop.	8-inch stop.	10-inch stop.	12-inch stop.	16-inch stop.	20-inch stop.	23-inch stop.	30-inch stop.	36-inch stop.	Total.	Frames and covers.	Fire plugs.	Plug cases.	Stop boxes.	Lead.	Gasket.
First District	.....	1	12	.....	.....	.....	.....	.....	.....	.....	.....	13	7	43	50	59	3,000	3
Second District	.....	8	21	4-way 3	1	.....	.....	.....	.....	.....	.....	33	87	99	103	151	17,863	7
Third District	.....	6	18	.....	.....	.....	.....	.....	.....	.....	.....	24	58	60	66	162	.....	9
Fourth District	.....	5	62	.....	11	8	5	13	.....	7	8	119	82	79	89	139	.....	14
Germantown	.....	.....	6	.....	1	.....	.....	.....	.....	.....	.....	7	6	12	12	82	.....	.....
Manayunk	.....	6	7	.....	.....	.....	.....	.....	.....	.....	.....	13	9	5	15	12	3,120	1
Roxborough	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	26	.....	.....
		26	126	4-way 3	13	8	5	13	.....	7	8	209	249	296	335	631	23,983	34

Stop-cocks, fire-plugs and casings, stop-cock boxes, frames, covers, and ferrules, made and fitted up at the City shop from the year 1867 to 1879, inclusive.

YEARS.	3-inch stop-cocks.	4-inch stop-cocks.	6-inch stop-cocks.	8-inch stop-cocks.	10-inch stop-cocks.	12-inch stop-cocks.	16-inch stop-cocks.	20-inch stop-cocks.	23-inch stop-cocks.	30-inch stop-cocks.	36-inch stop-cocks.	Total stop-cocks.	New fire-plugs.	Fire-plugs, cases.	Stop-boxes.	Frames and covers.	½-inch ferrules.	⅝-inch ferrules.	¾-inch ferrules.	1-inch ferrules.	Total ferrules.
1867	.....	34	108	1	4	5	5	.....	.....	.....	.....	157	148	227	433	164	1,770	460	137	117	2,484
1868	1	51	94	2	4	5	.....	.....	4	2	1	164	143	222	492	165	2,501	257	84	24	2,866
1869	8	71	175	4	6	8	2	4	2	2	4	286	202	291	600	279	3,700	431	50	.....	4,181
1870	7	93	208	4	4	10	5	.....	.....	6	6	343	223	307	600	317	4,200	450	100	100	4,850
1871	.....	113	218	9	13	17	7	6	2	6	4	395	176	254	641	459	5,025	100	25	.....	5,150
1872	15	120	226	8	15	6	.....	.....	.....	4	3	397	226	324	620	409	5,200	100	50	36	5,386
1873	12	108	406	.....	7	29	8	10	.....	.....	17	597	333	423	920	692	4,400	170	104	31	4,705
1874	15	104	560	18	12	12	6	3	1	3	2	736	423	653	1,102	635	4,400	100	100	64	4,664
1875	.....	15	397	16	38	19	.....	.....	1	.....	.....	486	308	379	693	566	4,100	.....	.....	41	4,141
1876	.....	39	282	20	46	19	.....	8	.....	10	5	429	278	374	494	465	4,000	.....	140	.....	4,140
1877	.....	25	282	.....	10	6	.....	5	.....	10	.....	388	214	328	670	370	4,100	100	.....	25	4,225
1878	.....	26	212	.....	.....	28	.....	9	.....	6	.....	281	532	334	665	393	3,200	150	50	25	3,425
1879	.....	14	128	4	16	8	8	10	.....	2	8	198	276	324	694	60	537	50	50	78	2,715

Inventory of Articles Manufactured during the year 1879.

14	4-inch stop, at	$22 00, - - - - -		$308 00
128	6 " " at	25 00, - - - - -		3,200 00
4	8 " " at	55 00, - - - - -		220 00
16	10 " " at	67 00, - - - - -		1,072 00
8	12 " " at	75 00, - - - - -		600 00
8	16 " " at	100 45, - - - - -		803 60
10	20 " " at	147 90, - - - - -		1,479 00
2	30 " " at	253 20, - - - - -		506 40
8	36 " " at	376 13, - - - - -		3,009 04
276	new fire-plugs at	28 00, - - - - -		7,728 00
324	" " cases at	7 50, - - - - -		2,430 00
694	stop boxes at	3 00, - - - - -		2,082 00
2411	ferrules at	50, - - - - -		1,205 50
Patterns, - -		- - - - - - -		934 67
				$25,578 21

OPERATIONS

—OF—

THE WORKS

—FOR—

1879.

Actual and comparative amount of coal used by the different pumping engines for the year 1879.

Engines.	Description.	Total gallons of water pumped.	Total tons of coal consumed.	Actual lift in feet, friction included.	Tons of coal required to lift 1 million gallons into reservoir.	Tons of coal required to lift 1 million gall's to the h'ght of 100 feet.	C'st of coal to pump 1 million gall's to h'ght of 100 ft. coal taken at the price at each of the w'ks for the year.	Hours run.	Remarks.
Schuylkill No. 4.....	Cornish.....	93,493,750	165½	120	1.77	1.47	$4 60	440½	Fires in continuous operation during the time run.
" " 5.....	"	404,557,500	505¼	120	1.24	1.03	3 22	1,595½	Fires in continuous operation during the time run.
" " 6.....	Simpson compound.....	1,650,992,110	1732	120 150 170	1.05	.83 .66 .70	2 59 2 06 2 19	4,900½	Fires in continuous operation during the time run.
" " 7.....	Rotative "	2,319,436,660	1809⅓	120	.77	.64	2 00	3,638	Fires in continuous operation during the time run.
Belmont No. 1.....	Worthington compound	1,291,341,900	3070 1/10	216	2.37	1.09	2 94	6,022	Fires in continuous operation.
" " 2.....	" "	638,127,672	1481¾	207	2.32	1.12	3 02	2,957¼	" " " "
" " 3.....	" "	2,025,493,345	4067½	207	2.01	.97	2 61	5,414½	" " " "
Delaware No. 1.....	Horizontal high pressure	2,194,470,977	2980¾	133	1.35	1.01	3 05	9,869	" " " "
" " 2.....	Beam condensing.....								
" " 3.....	Worthington compound								
Roxborough No. 1...	Cornish.....	161,442,240	578¼	358	3.58	1.00	3 10	1,720	Fires banked every day.
" " 2...	Worthington compound	979,914,480	3287¼	345	3.35	.97	3 00	4,863	" " " "
Roxborough Aux...	Worthington compound	3,389,250	61	80	1.85	2.31	7 16	1,735	" " " "
Frankford No. 1.....	Rotative compound.....	583,081,803	807⅓	203	1.38	.68	2 17	1,764	Fires in continuous operation during the time run.
" " 2.....	Worthington "	182,469,990	470½	203	2.57	1.26	4 03	1,874¼	Fires in continuous operation during the time run.
Chestnut Hill.....	Horizontal high pressure	87,532,350	465	125	5.31	4.25	15 30	4,106	Fires banked every day.

Comparison of the running expenses of Steam and Water Power.

	Water power.	Per cent.	Steam power.	Per cent.	Total water and steam.	Per cent.
Salaries	$10,575 00	.46	$49,405 60	.39	$59,980 60	.40
Coal	556 80	.03	65,031 78	.51	65,588 58	.43
Lubricating oils and lights	3,522 14	.15	7,040 42	.05	10,562 56	.07
All repairs	8,233 46	.36	7,133 40	.05	15,366 86	.10
Total	$22,887 40	100	$128,611 20	100	$151,498 60	100
Gallons water pumped into basin	7,278,357,488	.37	12,615,744,027	.63	19,894,101,515	100
Cost per million	$3 14		$10 19		$7 61½	
Gallons of water pumped 100 feet high	7,278,357,488	.25	22,507,472 421	.75	29,787,829,909	100
Cost per million	$3 14		$5 71		$5 09	

Percentage of water pumped at each station in the years 1878 *and* 1879.

WORKS.	1878.		1879.	
	U. S. Gallons.	Percentage.	U. S. Gallons.	Percentage.
Fairmount water power	8,322,288,784	43,569	7,278,357,488	37.00
Schuylkill steam power	2,902,600,630	15,196	4,468,480,020	22.46
Belmont steam power	4,076,537,188	21,343	3,954,962,917	19.88
Delaware steam power	2,133,094,379	11,167	2,194,470,977	11.00
Roxborough steam power	1,052,782,483	5,511	1,141,356,720	5.74
Roxborough Auxiliary	3,303,060	0,017	3,389,250	0.17
Chestnut Hill steam power	78,267,900	0,409	87,532,250	0.04
Frankford steam power	532,789,858	2,789	765,551,793	3.85
Total pumpage	19,101,664,332	100,00	19,894,101,515	100.00

Operations of the Fairmount Water Works for the year 1879.

Months.	Running time.	Number of strokes during the month.	Total number of gallons pumped during the month.	Average gallons per day.	Coal.	Tallow.	Lubricating & cylinder oil.	From Penn'a Hospital Reports. Rain fall during the month.	From Penn'a Hospital Reports. Mean temperature.
	Days.				Pounds.	Pounds.	Quarts.	Inches.	Degrees.
January	31	2,253,488	731,683,888	23,602,706	Heating Mill House.	25	105	2.81	28.83
February	28	2,064,767	652,728,219	23,311,722		.....	102	1.75	30.19
March	31	2,400,454	772,320,488	21,913,561		28	113	2.50	41.27
April	30	2,318,062	755,985,573	25,199,519		.....	129	7.06	49.41
May	31	2,359,520	915,093,842	29,519,156		20	157	1.31	64.63
June	30	1,650,569	687,599,885	22,919,996		15	173	7.85	73.18
July	31	907,976	391,533,528	12,630,113		.....	97	4.57	77.32
August	31	1,454,762	585,083,342	18,873,656		.....	135	8.43	74.53
September	30	1,098,458	467,106,465	15,570,215		15	77	1.29	64.70
October	31	621,323	285,177,343	9,198,624		.....	39	0.44	62.09
November	29	620,662	285,511,882	9.517,060		14	34	1.61	42.96
December	31	2,050,234	748,533,093	24,146,228		.....	149	6.35	37.81
	Total.	Total.	Total.	Average.	Total.	Total.	Total.	Total.	
	364	19,800,275	7,278,357,488	19,950,213	389,760	117	1,310	45.97	

DE

WHEEL NO. 7.

HOURS.			TOTAL HOURS.	HOURS STOPPED.				
Hours run.	HOURS STOPPED. For high or low water, or full Reservoir.	For repairs.	Total hours run.	For high or low water, or for full Reservoir.	For repairs.	Average water flowing over flash boards.	Average height of water in Fairmount Reservoir.	Average height of water in Corinthian Reservoir.
642	102		3,818	646	744	1.39	11.3	23.5
566	106		3,368	664	672	2.94	9 5	24.2
660	84		3,999	465	744	2.35	11.2	23.8
604	116		3,888	480	672	1.96	11.4	23.7
526	218		3,677	1,531	.....	.17	11.1	24.5
150	210	360	2,511	2,169	360	.22	11.4	24.2
77	403	264	1,333	3,611	264	.16	11.5	22.9
209	535		2,196	3,012	.....	1.01	11.5	23.5
89	631		1,696	3,105	239	.00	9.7	23.8
13	731		923	3,445	840	.00	11.5	23.7
.....	696	24	962	3,526	552	.00	11.6	23.6
....	.....	744	3,158	1.306	744	3.29	11.5	24.1
536	3,832	1,392	31,529	23,960	5,831			
verage gallons p			e.....	.52	.39	.09		
evolutions per n								

Operations of the Schuylkill Works for the year 1879.

Months.	Running Time.	Number of strokes during the month.	Total number of gallons of water pumped during the m'th.	Average gallons per day.	Coal.	Tallow.	Lubricating and cylinder oil.
	Days.				Pounds.	Pounds.	Quarts.
January	24	253,418	127,523,440	4,113,659	318,864	230	106
February	23	279,870	139,782,110	4,992,218	313,316	273	86
March	15	188,996	86,089,340	2,777,075	242,144	246	74
April	13	145,485	64,788,400	2,159,613	184,124	197	69
May	12	213,672	98,500,910	3,177,448	272,720	244	123
June	28	683,387	400,312,950	13,343,795	812,336	720	281
July	30	1,110,520	728,506,000	23,500,193	1,495,760	948	462
August	27	819,060	545,726,920	17,604,094	1,104,096	789	317
September	30	928,812	634,719,670	21,157,322	1,252,160	919	317
October	31	998,978	665,198,470	21,458,015	1,287,776	1016	331
November	30	1,010,775	675,729,890	22,524,329	1,442,336	1078	366
December	30	533,888	301,601,920	9,729,094	709,856	770	229
	Total.	Total.	Total.	Average.	Total.	Total.	Total.
	293	7,166,861	4,468,480,020	12,258,850	9,435,488	7,430	2,761

Operations of the Delaware Water Works for the year 1879.

Months.	Running time.	Number of strokes during the month.	Total number of gallons of water pumped during the month.	Average gallons per day.	Coal.	Tallow.	Lubricating and cylinder oil.
	Days.				Pounds.	Pounds.	Quarts.
January	31	417,524	149,056,068	4,808,260	503,008	80	87
February	21	308,608	105,709,820	3,775,350	375,078	35	79
March	30	481,450	171,877,650	5,544,440	531,950	12	99
April	30	847,793	230,986,741	7,699,558	766,337	81	126
May	31	672,399	196,344,061	6,333,679	608,759	102	119
June	30	526,580	183,704,275	6,123,476	493,260	18	115
July	31	715,986	220,462,628	7,111,698	614,435	61	141
August	31	703,158	211,540,590	6,823,890	621,426	60	137
September	30	532,372	170,873,834	5,695,794	470,879	16	117
October	31	801,693	223,688,116	7,215,746	648,147	58	139
November	30	653,227	200,093,615	6,669,787	610,241	39	142
December	27	410,235	120,133,579	4,197,857	433,341	.....	116
	Total.	Total.	Total.	Average.	Total.	Total	Total.
	353	7,071,025	2,194,470,977	6,012,222	6,676,861	562	1,447

	DUTY.				RESERVOIR.		LUBRICANTS.	
	Lift in feet, friction included.	Gallons raised into reservoir, per pound of coal.	Gallons raised 1 foot high per pound of coal.	Duty in foot-pounds of coal.	Maximum height.	Average height.	Pounds of tallow.	Quarts of lubricating oil.
68	132.9	296.3	39,382	328,183	17′—6″	16′—2″	80	87
20	132.9	281.8	37,456	312,133	17′—11″	14′—8″	35	79
50	132.9	323.1	42,941	357,842	17′—6″	15′—2″	12	99
41	132.9	301.4	40,058	333,817	17′—4″	15′—3″	81	126
61	132.9	322.5	42,865	357,208	17′—7″	16′—5″	102	119
75	132.9	372.4	49,496	412,467	17′—7″	16′—2″	18	115
28	132.9	358.8	47,685	397,375	17′—8″	16′—4″	61	141
90	132.9	340.4	45,241	377,008	17′—10″	16′—5″	60	137
34	132.9	362.9	48,227	401,892	17′—7″	15′—11″	16	117
16	132.9	345.1	45,864	382,200	17′—9″	16′—0″	58	139
15	132.9	327.9	43,578	363,150	17′—2″	16′—8″	39	142
79	132.9	300.3	39,910	332,583	17′—7″	16′—4″	.....	116
e.					Aver'ge.	Aver'ge.	Total.	Total.
81					17′—7″	16′—0″	562	1,417

Operations of the Belmont Water Works for the year 1879.

Months.	Running time.	Number of strokes during the month.	Total number of gallons of water pumped during month.	Average gallons per day.	Coal.	Tallow.	Lubricating and cylinder oil.
	Days.				Pounds.	Pounds.	Quarts.
January	31	1,059,324	324,188,952	10,457,708	1,741,770	679	224
February	28	740,957	225,871,896	8,066,853	1,342,093	517	225
March	31	708,881	280,951,358	9,062,947	1,266,35[illegible]	574	277
April	30	709,520	312,789,495	10,426,316	1,422,11[illegible]	373	429
May	31	958,584	362,959,251	11,708,363	1,650,88[illegible]	155	592
June	30	781,976	313,237,935	10,441,264	1,477,91[illegible]	176	277
July	31	976,818	383,125,924	12,358,900	1,807,371	477	231
August	31	1,026,134	403,454,310	13,014,655	1,987,106	580	251
September	30	1,001,188	392,449,857	13,081,662	1,845,872	502	271
October	31	1,044,418	411,366,839	13,269,898	2,018,643	485	274
November	30	915,760	334,666,705	11,155,557	1,703,295	403	227
December	31	599,871	209,900,395	6,770,980	1,044,034	376	208
	Total.	Total.	Total.	Average.	Total.	Total.	Total.
	365	10,526,431	3,954,962,917	10,835,515	19,307,447	5,297	3,492

Operations of the Roxborough Water Works for the year 1879.

Months.	Running time.	Number of strokes during the month.	Total number of gallons of water pumped during month.	Average gallons per day.	Coal.	Tallow.	Lubricating and cylinder oil.
	Days.				Pounds.	Pounds.	Quarts.
January	31	310,250	91,523,750	2,952,379	832,550	83	75
February	28	382,471	85,077,193	3,038,471	660,045	148	130
March	31	409,707	89,767,301	2,895,719	740,577	112	78
April	30	272,797	80,469,805	2,682,327	641,705	113	118
May	31	390,031	94,509,953	3,048,708	670,999	.....	93
June	30	427,303	99,375,945	3,312,531	707,867	.....	144
July	31	409,846	108,879,042	3,512,227	800,049	.....	156
August	31	376,079	106,376,561	3,431,502	668,430	.....	121
September	30	340,997	100,594,115	3,353,137	669,565	.....	90
October	31	350,187	103,305,165	3,332,425	848,199	.....	110
November	30	303,978	89,673,510	2,989,117	701,771	.....	133
December	31	363,476	91,804,380	2,961,432	716,975	77	49
	Total.	Total.	Total.	Average.	Total.	Total.	Total.
	365	4,337,104	1,141,356,720	3,127,005	8,658,732	533	1,339

Operations of the Auxiliary Water Works at Roxborough for the year 1879.

Months.	Running time.	Number of strokes during the month.	Total number of gallons of water pumped during the month.	Average gallons per day.	Coal.	Tallow.	Lubricating and cylinder oil.
	Days.				Pounds.	Pounds.	Quarts.
January	31	16,120	241,800	7,800	13,440	6	12
February	28	18,230	273,450	9,766	8,960	.....	.....
March	31	20,136	302,040	9,743	13,440	.....	.....
April	30	17,301	259,515	8,650	15,680	.....	.....
May	31	18,409	276,135	8,907	6,720	.....	.....
June	30	23,040	345,600	11,520	.....	.....	.....
July	31	20,170	302,550	9,759	11,200	.....	.....
August	31	21,750	326,250	10,524	13,440	.....	.....
September	30	16,520	247,800	8,260	17,920	.....	.....
October	31	18,604	279,060	9,001	8,960	.....	.....
November	30	17,430	261,450	8,715	15,680	.....	.....
December	30	18,240	273,600	9,120	11,200	.....	.....
	Total.	Total.	Total.	Average.	Total.	Total.	Total.
	364	225,950	3,389,250	9,286	136,640	6	12

Operations of the Chestnut Hill Water Works for the year 1879.

Months.	Running time.	Number of strokes during the month.	Total number of gallons of water pumped during the m'th.	Average gallons per day.	Coal.	Tallow.	Lubricating and cylinder oil.
	Days.				Pounds.	Pounds.	Quarts.
January	31	272,400	4,835,100	155,970	66,080	46½	25
February	28	222,000	3,940,500	140,732	53,700	40	20
March	31	262,200	4,654,050	150,131	63,280	40	20
April	30	274,200	4,867,050	162,235	66,640	40	20
May	31	330,000	5,857,500	188,952	73,920	45	25
June	30	407,400	7,231,350	241,045	87,920	50	30
July	31	596,400	10,586,100	341,487	116,480	60	40
August	31	572,400	10,160,100	327,745	113,120	60	40
September	30	547,800	9,723,450	324,115	104,160	60	40
October	31	541,800	9,616,950	310,224	103,040	60	40
November	30	474,000	8,413,500	280,450	98,000	60	40
December	31	430,800	7,646,700	201,507	95,200	55	35
	Total.	Total.	Total.	Average.	Total.	Total.	Total.
	365	4,931,400	87,532,350	239,815	1,041,540	616½	375

TS.

	oil.
	8
	4
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	56
	25
	12
	13
	22
	56
	32
	52
	48
	38
otal.	374

Operations of the Frankford Water Works for the year 1879.

Months.	Running time.	Number of strokes during the month	Total number of gallons of water pumped during the month.	Average gallons per day.	Coal.	Tallow.	Lubricating and cylinder oil.
	Days.				Pounds.	Pounds.	Quarts.
January	29	918,088	72,089,908	2,324,835	396,163	55	8
February	21	512,887	40,261,629	1,437,915	252,809	76½	4
March	15	377,692	29,648,822	956,413	161,442	70	8
April	11	237,710	35,579,570	1,185,985	139,470	34	56
May	23	488,844	102,637,348	3,310,882	333,445	82	37
June	22	240,520	78,650,040	2,621,668	238,984	6	13
July	22	244,105	62,187,284	2,006,041	212,548	22	22
August	28	234,097	92,899,719	2,996,765	299,969	8	56
September	17	151,723	49,615,056	1,653,835	170,017	8	32
October	23	263,213	86,070,651	2,776,473	252,223	14	52
November	17	193,126	56,890,002	1,896,333	209,756	8	48
December	18	198,612	59,041,764	1,904,573	200,565	3	38
	Total.	Total.	Total.	Average.	Total.	Total.	Total.
	246	4,110,622	765,551,793	2,097,402	2,862,391	386½	374

Total of Water pumped during the year 1879.

Months.	Fairmount Works.	Delaware Works.	Schuylkill Works.	Belmont Works.	Frankford Works.	Roxborough Works.	Roxborough Auxiliary.	Chestnut Hill Works.	Total of all the Works.	Percentage of consumption.	Average per day.	Highest number gallons in one day.	Lowest number gallons in one day.
January ...	731,683,888	149,056,068	127,523,440	324,188,952	72,069,908	91,523,750	241,800	4,835,100	1,501,122,906	89	48,422,932	57,903,000	36,551,000
February..	652,728,219	105,709,820	139,782,110	225,871,896	40,261,629	85,077,193	273,450	3,940,500	1,253,644,817	82	44,773,029	57,100,000	36,986,000
March.....	772,320,488	171,877,650	86,089,340	280,951,358	29,648,822	89,767,301	302,040	4,654,050	1,435,611,049	85	46,277,778	55,937,786	31,560,457
April.....	755,935,573	230,986,741	61,788,400	312,789,495	35,579,570	80,469,805	259,515	4,867,050	1,485,726,149	91	49,524,205	64,512,543	37,241,596
May.....	915,093,842	196,344,061	98,560,910	362,959,251	102,637,348	94,509,953	276,135	5,857,500	1,776,179,000	105	57,296,097	64,652,400	51,766,600
June	687,599,885	183,704,275	400,312,950	313,237,935	78,650,040	99,375,945	345,600	7,231,350	1,770,457,980	108	59,015,266	68,021,788	51,376,535
July.....	891,533,528	220,462,628	728,506,000	383,125,924	62,187,284	108,879,042	302,550	10,586,100	1,905,583,056	113	61,507,285	72,616,000	50,161,000
August.....	585,083,342	211,540,590	545,726,920	403,454,310	92,899,719	106,376,561	326,250	10,160,100	1,955,567,792	116	63,082,832	70,442,132	53,555,172
September	467,106,465	170,873,834	634,719,670	392,449,857	49,615,056	100,594,115	247,800	9,723,450	1,825,330,247	112	60,844,342	72,614,607	52,710,146
October.....	235,177,343	223,688,116	665,198,470	411,366,839	86,070,651	103,305,165	279,060	9,616,950	1,784,702,594	106	57,571,051	66,337,000	44,143,000
November	2 5,511,822	200,093,615	675,729,890	334,666,705	56,890,002	89,673,510	261,450	8,413,500	1,651,240,494	101	55,041,350	65,494,794	45,780,961
December	748,533,093	130,133,579	301,601,920	209,900,395	59,041,764	91,804,380	273,600	7,646,700	1,548,935,431	92	49,965,660	66,507,385	41,144,951
	Total.	Total.	Total.	Total.	Total.	Total.	Total.	Total.	GrandTotal.	Av.	Average.	Average.	Average.
	7,278,357,488	2,194,470,977	4,468,480,020	3,954,962,917	765,551,793	1,141,356,720	3,389,250	87,532,350	19,894,101,515	100	54,507,518	65,178,286	44,414,784

Amount of water pumped by all the Works from 1854 *to* 1879, *inclusive, in U. S. gallons.*

YEAR.	FAIRMOUNT.		DELAWARE.		SCHUYLKILL.		TWENTY-FOURTH WARD & BELMONT.		ROXBOROUGH AND GERMANTOWN.		CHESTNUT HILL.		FRANKFORD.		TOTALS.	
	Total water pumped.	Daily average.	Total water pumped.	Daily aver'ge	Total water pumped.	Daily aver'ge.	Total water pumped.	Daily aver'ge	Total water pumped.	Daily aver'ge.	Total water pumped.	Daily av'ge.	Total water pumped.	Daily av'ge.	Total for all the works.	Total daily aver'ge.
1854	2,286,402,222	6,264,116	618,173,121	1,693,625	1,366,011,559	3,742,497									4,270,586,902	11,700,238
1855	2,787,736,850	7,637,635	567,804,060	1,555,628	1,525,987,725	4,180,788	9,538,170	26,132							4,891,066,805	13,400,183
1856	2,867,188,965	7,833,850	769,566,040	2,102,639	1,980,637,500	5,411,578	52,577,642	143,655							5,669,970,147	15.491,722
1857	3,059,797,730	8,383,007	811,462,085	2,223,184	2,315,832,461	6,344,746	121,948,840	334,106							6,309,041,116	17,285,044
1858	3,058,418,667	8,379,229	757,187,690	2,074,487	2,819,641,992	7,725,047	204,177,624	559,391							6,839,425,973	18,738,153
1859	3,390,271,757	9,288,416	868,567,100	2.379 636	2,643,736,620	7,243,114	265,456,170	727,277							7,168,031,647	19,638,443
1860	3,612,989,017	9,871,555	872,144,980	2,382,910	2,696,960,210	7,368,744	283,646,070	774,989							7,465,740,277	20,398,197
1861	3,731,785,628	10,224,070	983,805,740	2,695,358	2,527,182,710	6,923,788	353,313,900	967,983							7,596,087,978	20,811,200
1862	3,564,724,753	9,766,369	909,126,440	2,490,757	3,038,527,420	8,324,733	420,507,810	1,152,076							7,932,886,423	21,733,933
1863	5,586,712,091	15,306,060	1,182,539,680	3,239,835	2,203,769,280	6,037,724	525,754,090	1,440,422							9,498,775,141	26,024,041
1864	5,970,801,329	16,313,665	1,090,884,060	2,980,558	1,725,444,660	4,714,330	519,877,800	1,420,431							9,307,007,849	25,428,983
1865	7,082,015,640	19,402,783	1,429,591,700	3,916,690	2,005,038,484	5,493,256	535,923,360	1,468,283							11,052,569,184	30,281,011
1866	7,721,817,582	21,155,665	1,271,841,020	3,484,496	947,652,428	2,596,308	606,665,380	1,662,097	106,369,060	291,422					10,654,345,470	29,189,987
1867	7,990,416,594	21,891,552	427,935,060	1,172,425	1,590,248,454	4,356,845	677,717,190	1,856,759	177,104,200	485,217					10,863,421,498	29,762,798
1868	8,024,530,911	21,924,948	705,442,350	1,927,438	2,337,365,642	6,386,245	727,824,780	1,988,592	190,015,200	519,167					11,985,178,883	32,746,390
1869	7,489,611,069	20,519,482	1,042,780,453	2,856,934	2,735,569,020	7,494,709	928,561,494	2,544,004	218,229,800	597,890					12,414,752,336	34,013,020
1870	8,134,985,170	22,287,631	1,186,131,144	3,249,674	3,003,737,166	8,229,417	*850,011,192	2,328,798	227,946,600	624,511					13,402,811,272	36,720,030
1871	8,821,728,593	24,169,065	1,007,378,521	2,759,941	2,201,294,172	6,030,943	1,054,210,990	2,888,249	‡413,787,205	1,133,664					13,498,399,481	36,981,916
1872	†7,366,632,573	20,127,411	1,474,531,040	4,028,773	2,223,287,070	6,074,555	1,456,756,728	3,980,210	‡518,811,050	1,417,517					13,040,018,461	35,628,465
1873	†8,717,538,594	23,883,667	1,364,109,884	3,737,287	1,508,295,800	4,132,317	1,959,966,670	5,369,772	673,287,495	1,844,623					14,223,198,443	38,967,667
1874	†7,749,007,798	21,230,158	1,558,518,765	4,269,914	1,536,505,220	4,209,603	2,969,227,504	8,134,870	720,165,810	1,973,057					14,553,425,097	39,817,603
1875	†7,994,234,254	21,902,012	1,839,190,470	5,038,878	1,356,295,950	3,715,879	3,055,507,870	8,371,254	818,339,525	2,242,026	33,592,000	92,033			15,097,160,069	41,363,082
1876	†8,547,163,024	23,352,906	2,011,301,489	5,495,359	2,179,733,340	5,955,556	3,748,651,929	10,242,218	935,702,907	2,556,565	50,754,850	138,674			17,473,308,039	47,741,279
1877	9,492,419,433	26,015,985	2,149,106,828	5,865,390	1,729,810,384	6,297,697	3,486,809,917	9,594,170	960,670,580	2,648,008	58,427,850	158,912			17,817,144,792	48,983,958
1878	8,322,288,784	22,800,791	2,133,094,379	5,844,000	2,902,600,680	7,955,070	4,076,537,188	11,170,000	1,056,085,543	2,893,386	78,267,900	214,433	‖52,789,858	2,090,000	19,101,664,332	52,333,326
1879	7,278,357,488	19,950,213	2,194,470,977	6,012,222	4,468,480,020	12,258,850	3,954,962,917	10,835,515	1,144,745,970	3,136,564	87,532,350	239,815	765,551,793	2,097,402	19,894,101,515	54,507,518

* The works at Belmont were started October, 1870, at which date Twenty-fourth Ward Works were abandoned.

† Included in the Fairmount pumpage is that of the Worthington Engine, which, in 1872, was 146,540,888; in 1873, 9,711,208; in 1874, 166,984,376; in 1875, 324,225,056; in 1876, 172,505,781 gallons.

‡ The Roxborough Works commenced pumping December 21, 1870.

§ The Germantown Works were abandoned September 30, 1872.

‖ The Frankford Works commenced pumping April, 1878.

DISTRIBUTION

—OF THE—

WATER DEPARTMENT

—FOR THE—

Year 1879.

DISTRIBUTION.

During the year 1879, Councils by Ordinance directed the laying of 37,721 feet of water pipes, which, with the amount on our books at the beginning of the year, made a total of 219,143 feet, or 41 miles, 2,663 feet.

Of this, 41,613 feet, or seven miles and 4,653 feet, have been laid' leaving a balance on December 31st of 177,530 feet, or nearly thirty-four miles, to be put in as requested and as necessity may require.

Of the total amount laid, 21,575 feet, or more than one-half, were pipes of ten inches and upwards in diameter, laid for the purpose of increasing the water supply to complaining districts.

The people of Bridesburg were relieved by a twelve-inch pipe on Wheatsheaf lane from Frankford road to Richmond street, a distance of 5,204 feet, or nearly one mile in length.

A thirty-inch main was laid on Jefferson street, east from Broad to Ninth and north on Ninth to Dauphin. It was connected by means of two twenty-inch mains with the two eighteen-inch mains from the Delaware basin. One twenty-inch main was laid along Dauphin street from Ninth street to Seventh; the other twenty-inch main along Susquehanna avenue from Ninth street to Sixth. This thirty-inch main and the twenty-inch main on Susquehanna avenue were connected with the pipes at every street crossing, and controlled by valves on each side. On the north and west the valves of this line of pipe limit the Belmont distribution. Those on the south and east are open, forming a communication between the Corinthian and Delaware basins, and supply this part of the first system.

The thirty-inch main on Broad street, north of Jefferson street, formerly connected with the Corinthian distribution, is now controlled by a stop and is connected with the thirty-inch main on Jefferson street west of Broad, and thereby with the Belmont distribution. The water was turned into these pipes September 9th, 1879.

The twenty-inch main laid in 1878 from Spruce to Arch streets was continued north to Spring Garden street and west to the Fairmount reservoir, giving the old part of the city another large feeder, delivering the water to high ground in the vicinity of Twenty-first and Walnut streets. The water was turned on June 10.

The ten-inch pipe on Germantown road running south from Montgomery avenue was connected, by a twelve-inch pipe, with the eighteen-inch main on Norris street.

Both the material and labor in laying these supply mains were paid for out of the annual appropriation.

The re-lays amounted to 4,129 feet, principally in the old City, 2,755 feet were ten-inch pipes, substituted for the three and four-inch pipes around the Public Buildings.

Dead-ends and intersections have been connected, as shown in the following district reports.

The pipes are on the ground for the connection of the sixteen-inch pipe on South street with the thirty-inch main on Broad street, as recommended in report for last year, but permanent relief can only be afforded to that part of the City south of South street by giving it another supply main and substituting larger pipes for the old three and four-inch ones, so thickly laid throughout that section of the City.

Throughout the City there are thirty meters in use, principally by railroad companies, churches and manufacturing establishments.

Recommendations for Distribution.

1. Substitute larger for all pipes less than six inches in diameter throught the entire City.

2. At Twenty-first and Callowhill streets unite the twenty- and twenty-two-inch mains from Fairmount with a thirty-inch main to run down Twenty-first street to South street, one twenty-inch branch to run west to Grays Ferry road, thence to Federal street, the other from Twenty-first and South streets to Broad. This will give South street and south of South street an additional feeder, which will be from the Fairmount reservoir—6,000 feet of thirty-inch pipe and 7,700 feet of twenty-inch.

3. At Nineteenth and Poplar streets cut the thirty-inch main, and from it lay a twenty-inch main to connect with the twenty-inch pipe on the north side of Callowhill street, formerly supplied from Fairmount. Distance 4,000 feet of twenty-inch.

At Sixteenth and Spring Garden streets continue twenty-inch pipe south to Callowhill street and there connect with the twenty-inch pipe on the south side, formerly supplied from Fairmount. Distance 1,050 feet of twenty-inch.

4. Supply the thirty-inch main on Arch street with water from Corinthian avenue reservoir by means of the thirty-inch pipe from that reservoir via Fairmount.

5. Lay a sixteen-inch main on Broad street from Poplar to Callowhill street. Distance 4,000 feet of sixteen-inch.

6. Lay a sixteen-inch main down the centre of Market street.

7. Connect the ten-inch main, supplying the C. T. A. B. Fountain, with the ten-inch pipe on Elm avenue. Distance 1,000 feet of ten-inch pipe.

DISTRIBUTION.

SERVICE AND SUPPLY MAINS LAID IN 1879.

First District.

Iron Pipes laid in the First, Second, Third, Fourth, Twenty-sixth, and Thirtieth Wards.

Street.	Location.	Size.	Distance.
Broad E. S.	From Dickinson to Tasker,	6	430
Clarion,	" Tasker " Morris,	6	456
Diamond,	" Fitzwater " Brinton,	6	217
Fernon,	" 17th " 18th.	6	428
Juniper.	" Moore " Canal,	6	313
Mildenhall,	" Jackson, south,	6	405
Moore,	" Juniper, east,	6	48
Tiernan,	" Wharton, north,	6	242
Wilson,	" 21st, west,	6	345
Dead ends connected	Conroy with Juniper,	6	12
" " "	Canal " "	6	12
Pipe used for fire plugs, new locations		4	118
Total number of feet of new pipe,			3,026
Number of feet of 4 inch pipe laid,		118	
" " " " 6 " " "		2,908	
		3,026	
Pipe used for repairs		3	13
" " " "		4	174
" " " "		6	60
			247

Second District.

Iron pipes laid in the Fifth, Sixth, Seventh, Eighth, Ninth, Tenth, Twenty-Fourth, and Twenty-Seventh Wards.

Street.	Location.	Size	Distance.
Baring,	From 41st to Ridgway or Holly,	6	182
Eadline,	" 45th " 46th,	6	269
51st,	" Elm " Viola,	6	255
46th,	" Chestnut " Sansom,	6	282
	Amount carried forward,		988

Street.	Location.	Size.	Distance.
	Amount brought forward, - - -		988
Linwood,	From 39th to Union, - - -	6	418
Pear,	" Franklin " 52d. - - -	6	719
Sansom,	" 45th " 46th. - - -	6	561
St. Mark's Pl.	" Locust " Walnut, - - -	6	394
Union,	" Myrtle " Hutton, - - -	6	402
Viola,	" 51st, west - - -	6	269
21st,	" Arch to Spring Garden, (Supply main)	20	3,006
Two waste pipes on 20 inch main,	- - -	6	6
Connections to Public Buildings;	Juniper N. of Market, -	4	24
" " " "	S. Penn Sq. W. of Broad,	4	6
" "	Chur. of the Holy Trinity, 19th and Walnut,	4	17
" "	W. Spruce St. Presbyterian Church, -	4	36
Fire connection	Penna. R. R. Depot, Delaware Ave. S. of Walnut - - - - -	4	181
" "	Erie and Western Transportation Co. 236 S. 4th Street, - - - -	4	19
Plug connections,	- - - - - -	6	36
" "	- - - - - -	4	58
	Total feet of pipe,		7,140

Feet of 4 inch pipe, - - -	341	
" " 6 " " - - -	3,793	
" " 20 " " - - -	3,006	
	7,140	or 1 M. 1,887 feet.

Relaid.

S. Penn Square,	From Juniper to 15th, (formerly 3,)	10	788
" "	" " " " - - -	6	32
" "	" " " " - - -	4	12
Merrick,	" S. Penn Sq. " Filbert, (for. 3 and 4)	10	670
"	" " " " " - -	6	36
"	" " " " " - -	4	7
Juniper	" Chestnut " Arch, (formerly 3)	10	1,295
"	" " " " - -	6	72
"	" " " " - -	4	28
Letitia,	" " " Market, (formerly 3)	6	504
"	" " " " - -	10	2
"	" " " " - -	4	14
Harris Ct.,	" Letitia " dead end, (for. 2) -	6	96
Hurst,	" Lombard, south, (formerly 3) -	6	38
			3,594

	Size.	Distance
Pipe used for repairs,	3	2
" " " "	4	59
" " " "	6	47
" " " "	8	28
" " " "	10	6
" " " "	12	4
" " " "	16	9
Total,		155

Third District.

Iron pipes laid in the Eleventh, Twelfth, Sixteenth, Seventeenth, Eighteenth, Nineteenth, Twenty-third, Twenty-fifth, and Thirty-first Wards.

Street.	Location.	Size.	Distance.
Bath,	From Venango to Victoria,	6	203
Cambria,	" Emerald " Frankford Rd.,	6	340
5th.,	" Allegheny Ave., north,	6	130
Rihl,	" Palmer to Hanover,	6	322
Wheat Sheaf Lane	" Frankford R. " Richmond	12	5,204
Germantown Rd.,	" Montgomery " 5th., (supply pipe)	12	140
5th.,	" German. Rd. " Norris,	11	990
Connection for fire purposes,	433 Moyer Street,	4	19
" " " "	5th and Columbia. Wm. Johnson's mill,	4	35
" "	fire purposes, Penna. R. R. Co.,	4	41
Pipe used for fire plugs,		4	105
Total number of feet of new pipe laid,			7,529

Number of feet of 4 inch pipe laid,	200	
" " " " 6 " " "	995	
" " " " 12 " " "	6,334	
	7,529	

Pipe used for repairs,	4	135
" " " "	6	175
" " " "	10	75
" " " "	20	8
		393

Fourth District.

Iron pipes laid in the Thirteenth, Fourteenth, Fifteenth, Twentieth, Twenty-eighth, and Twenty-ninth Wards.

Street.	Location.		Size.	Distance.
Allegheny A. N. S.	From 140 ft. E.	of 16th E. -	6	131
" " "	17th	to 19th. - -	6	882
Bolton, " "	24th	" 25th. - -	6	454
Camac, "	Diamond	" Susquehanna, -	6	586
Colona, "	11th	" 12th. -	6	446
Cumberland, "	26th	" 27th. - -	6	437
Etting, "	Master	" Jefferson, -	6	509
Fawn, "	"	" " -	6	488
Stewart, "	24th	" 25th. - -	6	453
30th. "	Stiles	" Master - -	10	785
12th. "	Somerset	" Cambria, -	6	555
23d. "	York	" Huntingdon, -	6	1,110
27th. "	Susquehanna	" Dauphin, -	6	585
" "	Herman	" York, -	6	290
Virginia, "	23d	" 24th. - -	6	437
York, "	"	" Glenwood, -	6	621
Dauphin, "	9th	" Germantown Rd.	20	635
Susquehanna, "	9th	" 6th. - -	20	1,181
Spring Garden, "	21st	" Fairmount Res. -	20	2,452
Jefferson, "	Broad	" 9th. -	30	2,382
9th. "	Jefferson	" 56ft. N.of Dauph.	30	4,502
Waste pipe Spring Garden Street main		- - -	6	10
" " " " " "		- - -	4	4
Connection at 19th and Poplar crossing 19th St.		- -	10	54
" " Park A. and Norris St. crossing Park Ave.		-	6	80
" " Oxford St. Presbyterian Church,		- -	4	9
Overflow into Spring Garden Reservoir,		- - -	16	12
" " " " "		- - -	10	60
Connection to well Spring Garden Engine House,		-	6	129
Fire con. Dan'l. Maguire, S. W. cor. Ridge and Master,		-	4	30
Plug connections, - - - - - -		-	4	126
Total number of feet of new pipe laid,				20,435

Number of feet of 4 inch pipe laid,	-	169
" " " " 6 " " " -	-	8,203
" " " " 10 " " " -	-	899
" " " " 16 " " " -	-	12
" " " " 20 " " " -	-	4,268
" " " " 30 " " " -	-	6,884
		20,435 or 3 M. 4,595 ft.

Relaid.

Street.	Location.	Size.	Distance.
9th, south of Diamond,	- - - - -	6	300

Lowered.

Broad and Jefferson Sts.	- - - - -	30	100

Intersections Connected.

Connections to 30 in. pipe on Jefferson at Ontario, S. S.	-	6	12
" " " " " " " Park A. S. S.	-	6	6
" " " " " " " " " "	-	4	6
" " " " " " " 13th, B. S.	-	6	6
" " " " " " " Hutchinson, S. S.	-	6	6
" " " " " " " " " "	-	4	6
" " " " " " " 10th, B. S.	-	6	6
" " " " " " " Alder, S. S.	-	6	12
" " " " " " " Warnock, S. S.	-	6	6
" " " " " " " " " "	-	4	6
" " " " " " " 11th, B. S.	-	6	6
" " " " " " " Mervine, S. S.	-	6	12
" " " " " " " 12th, B. S.	-	6	6
" " " " " " " Camac, S. S.	-	6	6
" " " " " " " Fawn, S. S.	-	6	6
" " " " " " " Prospect, S. S.	-	6	12
" " " " " 9th St. " Oxford, B. S.	-	6	12
" " " " " " " Columbia, B. S.	-	6	12
" " " " " " " Montgomery, B. S.		6	10
" " " " " " " Berks, B. S.	-	6	24
" " " " " " " Norris, B. S.	-	6	12
" " " " " " " Diamond, B. S.	-	6	18
" " 20in. " " Susquehan." 9th St. B. S.	-	6	8
" " " " " " " 8th " -	-	6	6
" " " " " " " Franklin, -	-	6	10
" " " " " " " 7th. -	-	6	6
" " " " " " " 6th. -	-	20	6
" " " " " " " Marshall, -	-	6	6
Mellon and 12th. - - - - -	-	6	12
" " 13th. - - - - -	-	6	12
			274
Pipe used for repairs, - - - -	-	3	32
" " " " - - - -	-	4	161
" " " " - - - -	-	6	80
" " " " - - - -	-	10	7
" " " " - - - -	-	12	80
Total,			360

Germantown District.

Iron pipes laid in the Twenty-second, Twenty-fifth, and Twenty-eighth Wards.

Street.	Location.	Size.	Distance.
Dorritt,	from 18th to Cayuga,	6	487
Overflow at	Chestnut Hill Works,	10	114
Connection for	Young America Cricket Ground,	3	100
"	at Chestnut Hill Works from pumping main to 10 inch main from pool,	10	48
"	at Allens Lane and Germantown Road,	10	10
"	" " " " " "	4	60
Plug connections,		4	7
	Total feet of new pipe laid,		826

Number of feet of	3 inch pipe laid,	100
" " "	4 " " "	67
" " "	6 " " "	487
" " "	10 " " "	172
		826

Relaid.

Highland, A. W.	of 28th. (formerly 1½ inch)	4	235

Lowered.

Highland Ave. E.	of 28th.	4	460
Pipe used for repairs,		4	6
" " "	"	10	14
			20

Manayunk District.

Iron pipes laid in the Twenty-first and Twenty-eighth Wards.

Street.	Location.	Size.	Distance.
Baldwin,	From Hamilton to Wood,	6	522
Cresson,	" Penn, north,	6	204
Fleming,	" D. E. 200 ft. S. of Levering to Martin,	6	38
	Amount carried forward,		764

Street.	Location.	Size.	Distance.
	Amount brought forward, - - - - -		764
Fowler,	From 256ft, 5½in. N. of Jefferson, north, -	6	60
Jefferson,	" Jackson, west, - - - -	6	155
Markle,	" 16ft. W. of H. L. of Terrace to 43ft. east of H. L. - - - - - - -	6	109
Mulberry,	" Wood street, S. W. - - -	6	400
Pechin,	" Shurs lane to Cedar, - - -	6	638
35th.	" 100ft. N. of Bowman to Fairview, -	6	415
Fire connection to S. S. Keeley's Mill, - - -		6	6
Dead end connected Wood with Baldwin, - - -		6	24
" " " Jackson " Jefferson, - -		6	18
Pipe used for plug connections, - - - -		4	68
Total number of feet of new pipe laid,			2,657

Number of feet of 4 inch pipe laid, -	68	
" " " " 6 " " " -	2,589	
	2,657	
Pipe used for repairs, - - - - - -	12	11

Recapitulation of pipe laid in the several districts during the year 1879.

Districts and Wards.	3-inch.	4-inch.	6-inch.	8-inch.	10-inch.	12-inch.	16-inch.	20-inch.	30-inch.	Totals.
First District, 1, 2, 3, 4, 26 and 30		118	2,908							3,026
Second District, 5, 6, 7, 8, 9, 10. 24 and 27		341	3,793					3,006		7,140
Third District, 11, 12, 16, 17, 18, 19, 23, 31 & part of 25.		200	995			6,334				7,529
Fourth District, 13, 14, 15, 20, 29 and part of 28		169	8,203		899		12	4,268	6,884	20,435
Germantown, 22 and part of 25 and 28	100	67	487		172					826
Manayunk, 21 and part of 28		68	2,589							2,657
Totals.	100	963	18,975		1,071	6,334	12	7,274	6,884	41,613
Pipe used for repairs	47	535	362	28	102	96	9	8		1,187
Pipe relaid		296	1,078		2,755					4,129
Pipe used for connections at intersections		18	250					6		274
Pipe lowered		460	100							560
Totals	47	1,309	1,790	28	2,857	96	9	14		6,150

	Feet.		Miles.	Feet.
Pipe as per last report	3,813,958	=	722	1,798
Pipe laid during 1879 excluding pipe laid for repairs, relays, etc	41,613	=	7	4,653
Total	3,855,571	=	730	1,171

Length of pipe laid previous to and since Consolidation, as per reports.

Years.	Miles.	Feet.
To 1855	242	1162
1855	6	44
1856	10	2079
1857	12	324
1858	13	3484
1859	22	784
1860	19	224
1861	11	2368
1862	9	954
1863	10	4161
1864	6	4287
1865	8	4754
1866	12	2964
*Germantown.	23	2922
1867	15	4971
1868	15	148
1869	22	1884
1870	26	1953
1871	30	572
1872	27	3661
1873	39	4816
*Chestnut Hill.	4	2102
1874	42	3511
1875	33	5148
1876	27	2033
Omitted in 1876.	.....	134
1877	16	144
1878	11	3570
1879	7	4653
Total...	730	1171

* Purchased.

Purposes for which pipes were laid during the year 1879.

		4-inch.	6-inch.	10-inch.	12-inch.	16-inch.	20-inch.	30-inch.	Totals.
On streets for supply			18,642	785	5,204				24,631
Connections to close dead ends			146	54					200
Connections for fire-plugs		428	36						518
Connections for fire purposes		325							325
Connections for motors		62	6						68
Connections to Public Buildings and Y.A.C.C. grounds	100	30							130
Pumping and supplying mains, with their connections		64	16	10	1,130		7,274	6,884	15,378
Drains and connect'ns at works, overflow into reservoir			129	222		12			363
Totals	100	963	19,002	1,071	6,334	12	7,274	6,884	41,613

Statement of the number of fire-plugs in the City by Districts and by Wards during 1879.

	First District.				Second District.					Third District.					Fourth District.					Germantown.				Manayunk.					Total.
	Wards.			Total.	Wards.				Total.	Wards			Total.		Wards.			Total.		Wards		Total.		Wards		Total.		
	2	3	26		5	10	24	27		19	25				20	28	29			22				21	28			
Prior to 1879				966					1511				1614					1018				364				237	5,770
During 1879	5	3	3	11	4	3	4	2	13	1	7	8	2	6	2	10		1	1	5	1	6					49
Totals				1007					1524				1652					1028				365				243	5,819

Number of attachments for fire purposes previously reported		179
Made during 1878—Second District	4	
Made during 1878—Third District	3	
Made during 1878—Fourth District	1	
Made during 1878—Manayunk	1	
	—	9
Total		188

Number of holes drilled for making new attachments to public mains during the year 1879.

Months.	½-in. diameter.	⅝-in. diameter.	¾-in. diameter.	1-in. diameter.	Totals.	Shut-offs.
January	25	1	...	3	29	30
February	26	...	1	1	28	14
March	229	8	3	3	243	51
April	216	6	3	4	229	24
May	296	5	3	8	312	38
June	257	7	3	5	272	41
July	222	3	1	7	233	54
August	253	7	2	9	271	42
September	314	16	5	9	344	79
October	358	12	4	9	383	91
November	408	19	10	13	450	69
December	123	4	5	3	135	28
Totals	2,727	88	40	74	2,929	561

Table of attachments in Wards and Districts.

Wards.	½-In. diameter.	⅝-in. diameter.	¾-In. diameter.	1-in. diameter.	Totals.	Shut-offs.
First District, 1, 2, 3, 4, 26, and 30	586	2	1	2	591	136
Second District, 5, 6, 7, 8, 9, 10, 24, and 27.	459	45	19	27	550	144
Third District, 11, 12, 16, 17, 18, 19, 23, 31, and part of 25	701	8	9	26	744	138
Fourth District, 13, 14, 15, 20, 29, and part of 28	655	25	8	15	703	99
Germantown, 22, and part of 25 and 28	169	7	3	4	183	38
Manayunk, 21, and part of 28	157	1	...	...	158	6
Totals	2,727	88	40	74	2,929	561

Repairs to mains, stops and plugs during 1879.

Districts.	To mains.	To stops.	To plugs.
First	88	178	284
Second	200	382	66
Third	454	306	131
Fourth	536	319	191
Germantown	35	37	23
Manayunk	89	14	20
Totals	1,402	1,236	695

Account of new stops and fire-plugs for 1879.

Districts.	No. of stops.	No. of plugs.
First	8	11
Second	30	13
Third	27	8
Fourth	57	10
Germantown	7	1
Manayunk	9	6
Totals	138	49

Number of valves raised in the different districts during the year 1879.

Districts.	3-inch.	4-inch.	6-inch.	8-inch.	10-inch	12-inch.	16-inch.	20-inch.	30-inch.	36-inch.	Totals.
First	.....	3	13	.....	2	1	.....	.....	.....	.....	19
Second	9	3	12	.....	.....	1	.....	.....	.....	.....	25
Third	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	1
Fourth	.....	10	34	1	1	.....	.....	.....	1	1	48
Total, 1879	9	16	60	1	3	2	.....	.....	1	1	93
" 1878	27	22	100	.....	3	1	.....	1	1	.....	155
" 1877	12	6	50	.....	1	.....	.....	1	.....	.....	70
" 1876	3	17	49	.....	3	.....	.....	1	.....	.....	73
" 1875	17	55	120	4	12	2	4	1	2	.....	217
" 1874	13	32	111	6	6	3	3	.....	.....	.....	174
Total for six years	81	148	490	11	28	8	7	4	4	1	782

Account of service pipes laid during 1879, *and the receipts therefor.*

	Pipe laid.	Frontage in feet.	Frontage in Dollars.	Amount to be paid.
Total feet of pipe laid	41,613.00			
Total feet of non-frontage	16,982.00			
Balance	24,631.00			
Intersections deducted	3,524.47			
Balance	21,106.53			
Single fronts, charged at $1 per foot		1,416.90	$1,416.90	
Double fronts, charged at $2 per foot		19,689.63	39,379.26	
Bills returned, pipe not laid			8.82	
Amount of frontage, feet		21,106.53		
Amount of frontage, Dollars			$40,804.98	
Corner allowances deducted			3,097.25	
Net amount of frontage to be collected				$37,707.73
Amount received by Registrar in 1874				$95.34
" " " 1878				86.00
" " " 1879				17,810.47
Amount sent to lien in 1874				85.00
" " 1879				10,348.99
Amount remaining on books				9,302.69
Total amount				$37,728.49
Overpaid				20.61
Amount				*$37,707.88

* The Difference---15 cents--due to reduction of inches to decimals.

Receipts from pipe frontage during 1879.

		Balance on books.	Pipe laid, 1878.	Total receipts.
Balance on books December 31, 1878		$27,617 14		
Less paid in 1878	$16 00			
" " 1877	16 00			
" " 1878	143 93—	175 93		
Balance		$27,441 21		
Collected by Registrar for pipe laid in 1878			$10,480 79	$10,480 79
Sent to lien in 1879 for pipe laid in 1878			16,461 72	
Owned by city			524 50	
Total			27,467 01	
Overpaid, etc			25 80	
Received by Registrar for pipe laid in 1879			27,441 21	$17,810 47
Received by Registrar on deposit pipe not laid				2,944 66
Total receipts for pipe frontage during 1879				31,235 92

MISCELLANEOUS TABLES

TABLE A.

Rain Fall at Philadelphia, from Pennsylvania Hospital Reports.

YEAR.	January.	February.	March.	April.	May.	June.	July.	August	September.	October.	November.	December.	Totals:	Reading, Pa.	Lebanon, Pa.
1810.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	32.66	.....	.....
1811.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	34.97	.....	.....
1812.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39.30	.....	.....
1813.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35 63	.....	.....
1814.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	43.14	.....	.....
1815.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	34.67	.....	.....
1816.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	27.95	.....	.....
1817.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	36.01	.....	.....
1818.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	30.13	.....	.....
1819.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	23.35	.....	.....
1820.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39.61	.....	.....
1821.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	32.18	.....	.....
1822.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	29.86	.....	.....
1823.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	41.85	.....	.....
1824.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	38.74	.....	.....
1825.....	0.84	3.26	4.63	.83	1.72	3.59	2.06	3.70	2.61	1.25	1.36	3.72	29.57	.....	.....
1826.....	1.11	2.13	5.80	3.87	.19	4.655	3.66	2.75	2.00	5.83	1.85	1.28	36.145	.....	.....
1827.....	2.86	3.55	1.23	2.83	2.50	2.09	2.97	5.75	.79	5.91	4.76	3.26	38.50	.....	.....
1828.....	2.05	2.75	3.35	3.82	3.49	2.69	5.33	1.51	4.62	1.39	6.71	.26	37.97	.....	.....
1829.....	5.37	3.75	2.87	4.99	2.68	3.44	4.35	4.61	2.01	2.30	3.97	1.51	41.85	.....	.....
1830.....	1 63	2.06	4.115	1.815	3.75	5.99	4.07	3.87	2.93	4.31	5.35	5.18	45.07	.....	.....
1831.....	6.22	2.44	3.97	5.20	1.07	3.56	4.17	5.39	5.33	4.51	1.88	1.20	44.94	.....	.....
1832.....	4.58	2.66	1.90	2.98	5.40	1.55	2.62	5.69	1.40	3.41	2.59	5.09	39.87	.....	.....
1833.....	3.97	1.24	2.22	.70	5.88	5.28	4.15	3.39	3.82	10.05	2.18	5.67	48.55	.....	.....
1834.....	2.49	2.22	2.02	2.83	3.52	3.99	4.35	.62	3.57	3.29	3.01	2.33	34.24	.....	.....
1835.....	2.75	1.81	3.83	4.33	1.99	6.27	6.55	2.05	2.63	1.22	3.19	2.68	39.30	.....	.....
1836.....	7.62	2.99	1.75	3.47	2.28	7.31	2.91	1.97	1.82	3.59	3.34	3.61	42.66	.....	.....
1837.....	2.50	3.58	3.76	2.83	4.86	2.83	5.89	4.06	2.28	.66	3.23	2.56	39.04	.....	.....
1838.....	2.20	2 19	3.171	3.586	3.577	6.600	2.376	2.780	9.519	4.896	3.350	1.044	45.238	.....	.....
1839.....	5.037	3.424	1.504	1.507	6.073	3.922	2.516	4.644	2.919	2.831	3.100	6.262	43.739	.....	.....
1840.....	1.841	3.009	2.626	6.827	2.688	5.948	4.538	5.554	2.502	5.734	2.486	3.647	47.400	.....	.....
1841.....	7.837	1.387	5 821	6.456	3.269	3.114	3.280	9.102	1.895	3.198	4.224	5.917	55 500	.....	.....
1842.....	1.358	4.265	2.835	5.307	5.865	3.192	11.805	3.786	1.269	1.712	3.487	3.657	48,538	.....	.....
1843.....	1.440	2.540	4.415	4.723	2.045	1.686	4.543	9.255	4.856	3.220	4.148	4.041	46,912	.....	.....
1844.....	4.052	1.449	4.430	1.354	3.091	3.351	5.284	2.309	4.034	5.025	2.951	2.753	40.173	.....	.....
1845.....	3.760	4.738	2.415	2.580	1.599	3.725	2.763	7.298	2.155	2.529	2.500	3.959	40.021	.....	.....
1846.....	4.680	3.330	4.598	2.112	3.444	3.300	4.604	4.272	.249	2.444	7.970	3.347	44.390	.....	.....
1847.....	4.730	4.569	4.700	.585	1.567	3.305	2.765	3.182	8.070	3.000	2.836	5.785	45.094	.....	.....
1848.....	2.030	1.443	2.756	1.541	4.902	4.433	3.281	1.714	1.805	3.747	2.343	5.007	35.002	.....	.....
1849.....	.730	2.610	5.470	1.752	3.995	2 195	2.933	6.975	1.404	5.595	2.600	5.836	42 095	.....	.....
1850.....	4.770	2.870	4.759	2.665	6.500	2.030	5.970	8.329	7.732	1 092	3.320	4.515	54.543	.....	.....
1851.....	1.230	3.110	3.475	4.565	4.817	3.438	2.524	2,555	1.130	3.025	3.356	2.275	35.500	.....	.....
1852.....	2.011	2.710	4.270	6.445	3.034	4.030	4.060	4.400	1.293	2.267	6.055	5.174	45.749	.....	.....
1853.....	1.845	4.440	2.462	3.835	5.173	1.100	6.296	3 088	4.463	3.470	2.320	2.165	40.657	.....	.....
1854.....	2.334	4 203	1.615	7.750	6.935	2 390	3.024	.842	3 798	1.545	2.834	4.910	40.180	.....	.....
1855.....	2.337	2.352	1.684	2.050	2.965	7.949	6.400	2.786	4.000	4.111	2.037	5.425	44.096	.....	.....
1856.....	4.537	1.237	2.232	3.515	2.595	1.986	1.508	6.000	4.014	1.296	2.070	2.937	33.927	.....	.....
1857.....	3.532	.790	1.831	6.786	5.547	7.500	3.915	7.590	1.105	2.690	1.450	5.550	48.286	.....	.....
1858.....	2 595	2,285	1.087	4.640	5.015	4.495	1.345	4.941	1.492	1.842	5.615	4.500	39.852	.....	.....
1859.....	6.675	3.660	6.985	5.610	2.250	6.013	4.071	4.736	7.681	3.132	3.820	3.490	58.123	.....	.....
1860.....	3.225	2.755	1.415	3.800	3.817	2.885	.985	8.401	2.850	4.520	6.130	3.310	44.093	.....	.....
1861.....	5.245	2.065	3.925	3.705	6.640	3.880	2.560	3,137	4.402	3.797	4.875	2.092	46.440	.....	.....
1862.....	4.795	4.640	3.553	4.160	2.308	6.975	2.465	.925	3.980	4.770	4.790	1.650	45.011	.....	.....
1863.....	4.720	4.680	5.885	7.015	4.510	4.250	6.009	1.447	.875	2.465	2.700	4.633	49.189	.....	.....
1864.....	1.705	.551	5.170	3.795	8.685	2.345	3.770	1.920	7.165	1.820	3.930	5.145	46.001	.....	.....
1865.....	3.610	5.825	4.710	2.830	7.210	4.750	2.970	3,770	7.960	3.050	3.960	5.610	56.255	.....	.....
1866.....	3.145	6.615	2.150	2.930	4.680	2.960	2.520	2,181	8.705	4.145	1.760	3.465	45 256	.....	.....
1867.....	1.762	3.892	5.465	1.810	7.320	11.025	2.387	15,816	1,720	4.320	2.940	2.730	61.187	.....	.....
1868.....	3.620	2.520	3.360	5.440	7.005	4.370	3.514	2,056	8.908	1.737	5.280	3.595	51.405	.....	.....
1869.....	4.280	4.760	5.305	2.120	4.235	5.585	2.885	1.280	3.250	6.320	3.725	5.115	48.860	.....	.....
1870.....	4.075	2.532	4.060	5.605	6.280	2.895	3.947	5.115	1.710	3.895	2.102	1.889	44.105	50.45	.....
1871.....	3.466	3.086	5.814	1.829	3.383	3.773	6.811	5.971	1.772	4.863	4.293	2.259	47.320	46.27	.....
1872.....	1.267	1.185	3.377	2.497	2.808	4.223	11.215	8.319	3.820	5.363	3.381	3.662	51.117	41.24	.....
1873.....	6.048	5.607	2.242	4 191	4.783	.887	5.553	12.289	4.045	5.889	4.995	1.757	58.286	58.49	.....
1874.....	4 218	2.823	1.595	7.509	2.697	2.664	2 759	6.531	3.987	1.650	2.229	2 249	40.911	36.71	.....
1875.....	2.360	3.284	3.925	1.360	1.575	5.258	4.174	6.584	3.035	1.827	5.544	2.918	41.844	.....	42.15
1876.....	2.023	3.680	5.605	1.999	5 189	2.209	6.223	1.215	7.776	1.210	9.025	3.169	49.323	.....	41.82
1877.....	2.893	1.550	5.097	2.962	1.215	5.512	6.196	1.007	3.882	6.963	6.507	1 363	45.147	.....	43.25
1878.....	4.566	2.172	3.641	2.541	4.329	4.750	5.313	4.833	1.418	2.391	2.891	4.873	43.718	37.23	36.46
1879.....	2.814	1.750	2.505	5.687	1.315	7.858	4.575	8.435	1.297	.447	1.615	6.351	44.649	32.22	34.54

Height of gauge at Hospital, 50 feet above the level of the sea.
The observations from 1810 to 1824, inclusive, were taken at Spring Mills, Penna.

TABLE B.

Average daily height of water above the comb of the old dam, and the average daily overflow over the flash boards.

Day of Month.	HEIGHT ABOVE THE LEGAL COMB OF DAM.												OVERFLOW OVER FLASH BOARDS.											
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May	June.	July.	August.	September.	October.	November.	December.
1	23	26	21	24	16	11	12	15	18	15	15	21	1	4	-1	2	-6	-11	-10	-7	-4	-7	-7	-1
2	22	21	22	21	14	10	11	15	17	15	10	18	—	-1	—	-1	-8	-12	-11	-7	-5	-7	-12	-4
3	16	22	21	20	12	12	10	15	18	15	13	17	-6	—	-1	-2	-10	-10	-12	-7	-4	-7	-9	-5
4	5	22	21	18	12	28	8	17	18	13	26	16	-17	—	-1	-4	-10	1	-14	-5	-4	-9	-6	-6
5	2	21	23	18	11	22	8	17	18	11	15	16	-20	-1	1	-4	-11	—	-14	-5	-4	-11	-7	-6
6	15	10	30	16	12	27	8	16	17	14	15	16	-7	-12	8	-6	-10	5	-14	-6	-5	-8	-7	-6
7	14	7	25	17	9	24	10	16	17	15	14	14	-8	-15	3	-5	-13	2	-12	-6	-6	-7	-8	-8
8	29	13	22	16	9	22	14	18	17	15	16	26	7	-9	—	-6	-13	—	-8	-4	-5	-7	-6	4
9	31	15	22	15	10	20	16	14	17	13	11	25	9	-7	—	-7	-12	-2	-6	-8	-5	-9	-11	3
10	25	15	23	14	9	12	15	15	15	13	13	23	3	-7	1	-8	-13	-10	-7	-7	-7	-9	-9	1
11	21	13	25	13	9	20	15	17	16	15	16	22	-1	-9	3	1	-13	-2	-7	-5	-6	-7	-6	—
12	19	52	28	22	10	21	16	14	17	13	16	23	-3	30	6	- -	-12	-9	-6	-8	-5	-9	-6	1
13	20	39	26	17	10	15	15	15	14	16	17	24	-2	17	4	-5	-12	-7	-7	-7	-8	-6	-5	2
14	18	31	25	17	9	10	17	16	16	17	17	24	-4	9	3	-5	-13	-12	-5	-6	-6	-5	-5	2
15	20	27	26	16	7	14	17	17	18	17	17	37	-2	5	4	-6	-15	-8	-5	-5	-4	-5	-5	15
16	13	26	22	15	12	14	15	17	21	17	13	29	-9	4	—	-6	-10	-8	-7	-5	-1	-5	-9	7
17	9	24	22	16	17	9	14	24	18	18	16	26	-13	2	—	-7	-5	-13	-8	-2	-4	-4	-6	4
18	14	23	27	47	22	10	16	25	16	17	16	25	-8	1	5	25	—	-12	-6	3	-6	-5	-6	8
19	10	24	24	36	22	18	15	35	16	12	16	24	-12	2	2	14	—	-4	-7	13	-6	-10	-6	2
20	12	22	24	29	23	15	12	24	15	14	16	23	-10	—	2	7	1	-7	-10	2	-7	-8	-6	1
21	9	19	22	27	24	9	15	21	14	17	15	23	-13	-3	—	5	2	-13	-7	-1	-8	-5	-7	1
22	8	18	22	25	23	10	15	18	16	18	14	23	-14	-4	- -	3	1	-12	-7	-4	-6	-4	-8	1
23	10	15	31	24	23	9	15	16	15	16	12	22	-12	-7	9	2	1	-13	-7	-6	-7	-6	-10	—
24	10	22	28	22	15	13	14	17	14	18	17	26	-12	—	6	- -	-7	-9	-8	-5	-8	-4	-5	4
25	9	21	23	21	18	10	16	19	16	18	16	35	3	-1	1	-1	-4	-12	-6	-3	-6	-4	-6	13
26	14	22	22	19	19	18	17	30	15	13	15	36	4	—	—	-3	-3	-4	-5	-8	-7	-9	-7	14
27	22	25	21	18	20	20	27	24	14	17	13	27	—	3	-1	-4	-2	-2	5	2	-8	-5	-9	5
28	25	23	27	18	17	19	20	22	13	18	15	25	3	1	5	-4	-5	-12	-2	- -	-9	-4	-7	3
29	33	...	24	21	15	13	14	17	16	17	17	26	11	.....	2	-1	-7	-9	-8	-5	-6	-5	-5	4
30	28	...	25	20	13	18	16	19	15	17	15	26	6	.....	3	-2	-9	-4	-6	-3	-7	-5	-7	4
31	26	...	25	...	11	....	15	17	....	16	...	31	4	.....	3	.....	-11	.....	-7	-5	....	-6	.....	9

This table represents the height of the water above the comb of the Old Fairmount Dam or the legal comb, and the water wasted over the flash board on the new dam, which is now twenty-two inches above the old comb.

TABLE C.

Showing the number of days in each month when the inches of water wasted over the Flash Boards of Fairmount Dam were the same.

Inches.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
½		1	3									1	5
1	1	2	3	1	3	1						5	16
2		2	3	2	1	1		3				3	15
3	3	1	5	1				1				3	14
4	2	2	2									5	11
5		1	2	1		1	1					1	7
6	1		2										3
7	1			1								1	3
8			1					1					2
9	1	1	1									1	4
10													
11	1												1
12													
13								1				1	2
14				1								1	2
15												1	1
16													
17		1											1
18													
19													
20													
25				1									1
30		1											1

HEAVY RAINS.

Philadelphia County—20 *years: from* 1859–1879.

J. A. KIRKPATRICK, *Observer.*

DATE.			Quantity in inches.	Duration of rain.			Rate per hour in inches.	Remarks.
Year.	Months.	Days						
1859	September.	16,17	4.10	in about	45	hours.		
1860	August.	13	4.60	"	3¼	"	1.40 in 1 honr.	
	November.	3	3.00	"	11	"		
1862	September.	11,12	5.40	"	22	"		
	November.	18-21	2.65	"	96	"		
1863	May.	5	3.33	"	24	"		
1864	May.	26	4.82	"	20	"		
1865	May.	21	2.75	"	15	"		
	September.	4	2.22	"	1½	"	1.97 in less than 1 hour.	
	November.	20,21	2.53	"	24	"		
1867	June	16	3.94	"	8	"		
	August.	14	4.30	"	14	"		
	August.	14,15	2.76	"	16	"		
	August.	7,8	3.00	"	8	"		
1868	September.	3,4	2.75	"	26	"		
1869	October.	3,4	3.95	"	34	"	0.70 in 1 hour.	
1872	July.	4	2,55	"	3¼	"		
	October.	24-26	4.05	"	54	"		
1873	August.	12-14	5.38	"	37	"		
	October.	19,20	3.08	"	24	"		
1874	January.	4-7	3.05	"	96	"		
	September.	15-17	2.76	"	45	"		
1876	March.	24,25	2.66	"	24	"		
	September.	16,17	2.65	"	27	"		
1877	October.	4	4.40	"	9	"	0.50 in 1 hour.	
1878	August.	1	*1.56 2.50	" "	⅔ 12	" "	2.08 in 1 hour.	The heaviest rain noted in 20 years
1879	July.	24	1.10	"	2	"		
	August.	17,18	3.12	"	25¼	"		

Compiled and arranged from my Original Records of Observations taken at 2014 Vine street, and reported for the Franklin Institute of Philadelphia.

*NOTE.—By C. G. D. Total rain August 1, 1878, was 2.5 inches at Pennsylvania Hospital.

Table of Rainfall in the Schuylkill Valley from 1870–'79, *inclusive.*

1870

LOCATION.	January	February	March	April	May	June	July	August	September	October	November	December	Totals.
Philadelphia	4.075	2 53	4.06	5.61	6.28	2 89	3.95	5.12	1.71	3.89	2.10	1.89	44.10
Reading	3.97	5.88	4.61	6.46	3,91	5.69	3.74	5.58	2.38	3.00	2.90	2.39	50.45
Lebanon	3.52	3.75	3.04	4.28	4.24	4.70	3.61	4.17	3.27	2.59	1.71	2.10	40.98

1871

Philadelphia	3.46	3 09	5.81	1.83	3.83	3.77	6 81	5.97	1.77	4.86	4.29	2.26	47.32
Reading	2.79	5.83	6 25	1 93	4.10	6.24	5 13	5.12	2.34	1 62	3.94	0.98	46.27
Lebanon	2.43	2.68	5 50	2.54	2.93	4.18	7.03	5.48	2.27	2.02	3.10	1.33	41.49

1872

Philadelphia	1.27	1.19	3.38	4.49	2 81	4.22	11.21	8.32	3.82	5.36	3.38	3.66	51.11
Reading	1 96	1.29	2.86	3.66	2.86	3 45	4.43	6.30	4.00	3.07	4.05	3.31	41.24
Lebanon	.99	1.11	1.79	2.52	2.79	3.12	3.09	8.63	3.86	3 79	2.54	2.77	37.00

1873

Philadelphia	6.05	5.61	2.24	4.19	4.78	.89	5.55	12.29	4.04	5.89	4.995	1.76	58.286
Reading	4.03	5.23	2.29	5.12	5.58	0.61	8.32	7.05	6.65	7.00	5.09	1.52	58.49
Lebanon	3.69	3.22	3.05	4.24	4 01	.67	7.82	9.43	3.42	7.79	3.28	1.95	54.57

1874

Philadelphia	4.22	2.82	1.595	7.51	2.70	2.66	2.76	6.53	3.99	1.65	2.23	2.45	40.91
Reading	3.39	3.39	1.63	6.42	2.51	0.87	6.39	2.56	3.52	1.35	1 89	2.79	36.71
Lebanon	2.85	2.86	2.20	5.94	2.79	1.21	6.25	3.28	2.32	.52	2.42	2.42	35.06

1875

Philadelphia	2.36	3.28	3.93	1.36	1.58	5.26	4.17	6.58	3.04	1 83	5.54	2.92	41.84
Reading													
Lebanon	2.79	2.79	4.68	2.97	1.86	3.93	2.96	8.24	2.41	3.39	3.49	2.64	42.15

1876

Philadelphia	2.02	3.68	5.61	1.999	5.19	2.21	6 22	1 22	7.78	1.21	9.03	3.17	49.32
Reading													
Lebanon	1.70	3.21	5.34	2.13	3 06	4 22	4.56	1.59	8.63	2.38	2.77	2.23	41.81

1877

Philadelphia	2.89	1.55	5.097	2.96	1.22	5.51	6-19	1.01	3.88	6.96	6.51	1.36	45.15
Reading								2 15	4.34	7.16	5.77	1.46	
Lebanon	2.78	2.09	4.33	3.09	1.54	5.73	4.43	1.92	3.27	6.64	5.53	1.30	43.25

1878

Philadelphia	4.57	2.17	3.64	2 54	4.33	4.75	5 31	4.83	1.42	3.39	2.89	4.87	43.72
Reading	5.01	2.43	3.44	2.75	3.48	2.73	1 63	1.84	3.18	3 74	2.63	4.37	37.23
Lebanon	3.47	2.76	3.61	3.62	5.12	3.60	1.24	1.99	.91	3.33	2.89	3.92	36.46

1879.

Philadelphia	2.81	1.75	2 50	7 06	1.31	7.85	4.57	8 43	1.29	.44	1.61	6 35	45.97
Reading	2.42	2.21	2 37	3.16	3.31	3 61	3.00	5.40	2.02	.67	1.57	2.48	32.22
Lebanon	2.17	2.21	2.30	2.54	2.76	3.90	3.39	4.26	2 93	1.49	1.77	4.82	31.54

NOTE.—Rainfall at Philadelphia observed at Pennsylvania Hospital. Elevation, 38 feet above tide water.

Rainfall at Reading from 1869 to 1875 observed by Dr. J. Hyel Raser, and during 1877 and 1878 by Henry T. Kendall, C. E., during 1879 by A. Harvey Tyson, C. E. Elevation at Reading, 225 feet above tide.

Rainfall at Lebanon observed by S. B. Lehman. Elevation, 495 feet above tide water.

Statement of material on hand in the several Purveyor's Districts, Jan. 1, 1880.

DIAMETER IN INCHES.

	3	4	6	8	10	12	16	18	20	23	24	30	36	48
Bands	.....	9	38	2	7	16	2	9	8	.....	5	12	23	69
Bevel Hubs	.....	25	89	10	25	4	.....	.....	.....	.....	.....	.....	.....	.....
Bonnets & Plugs	.....	17	29	10	19	3	4	1	6	.....	.....	5	2	2
Pipes	188	602	3243	1058	347	318	48	3	60	.....	3	82	48	219
Pipes, curved	.....	1	5	.....	.....	6	.....	.....	17	.....	.....	26	15	1
Pipes, flanged	.....	.....	.....	.....	.....	.....	.....	.....	11	.....	.....	4	1	.....
Pipes, offset	.....	19	5	4	.....	1	.....	.....	.....	.....	.....	.....	.....	.....
Pipes, O. G.	.....	.....	11	13	18	12	.....	.....	.....	.....	.....	.....	.....	.....
Pipes, Stand	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....
Saddles	.....	16	85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sleeves	28	140	137	38	30	12	22	15	17	.....	.....	14	4	3
Stops	.....	6	*24	.....	8	11	5	.....	8	1	.....	2	11	.....
Quarter Turns	.....	7	43	24	29	15	1	.....	1	.....	.....	.....	.....	.....

*1 Bartons.

Fire Plugs.		Goosenecks.		Meter.	Plug Branches.	Lead.	Clay.	Gasket.
Old	11	Old.	New.	6 in.				
Steam	19							
Hill's	73	65	166	1	9	55,106 lbs.	100 lbs.	150 lbs.
Hill's 2-way	8							
Hill's 3-way	8							
Marshall's	1							

	¾	4/4	3/6	4/6	6/6	4/8	6/8	8/8	4/10	6/10
Breeches Pipes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Double Branches	.....	47	.....	114	237	12	7	19	13	52
Single Branches	.....	12	.....	103	82	68	19	27	41	23
Reducers	22	.....	5	24	.....	5	18	.....	8	42

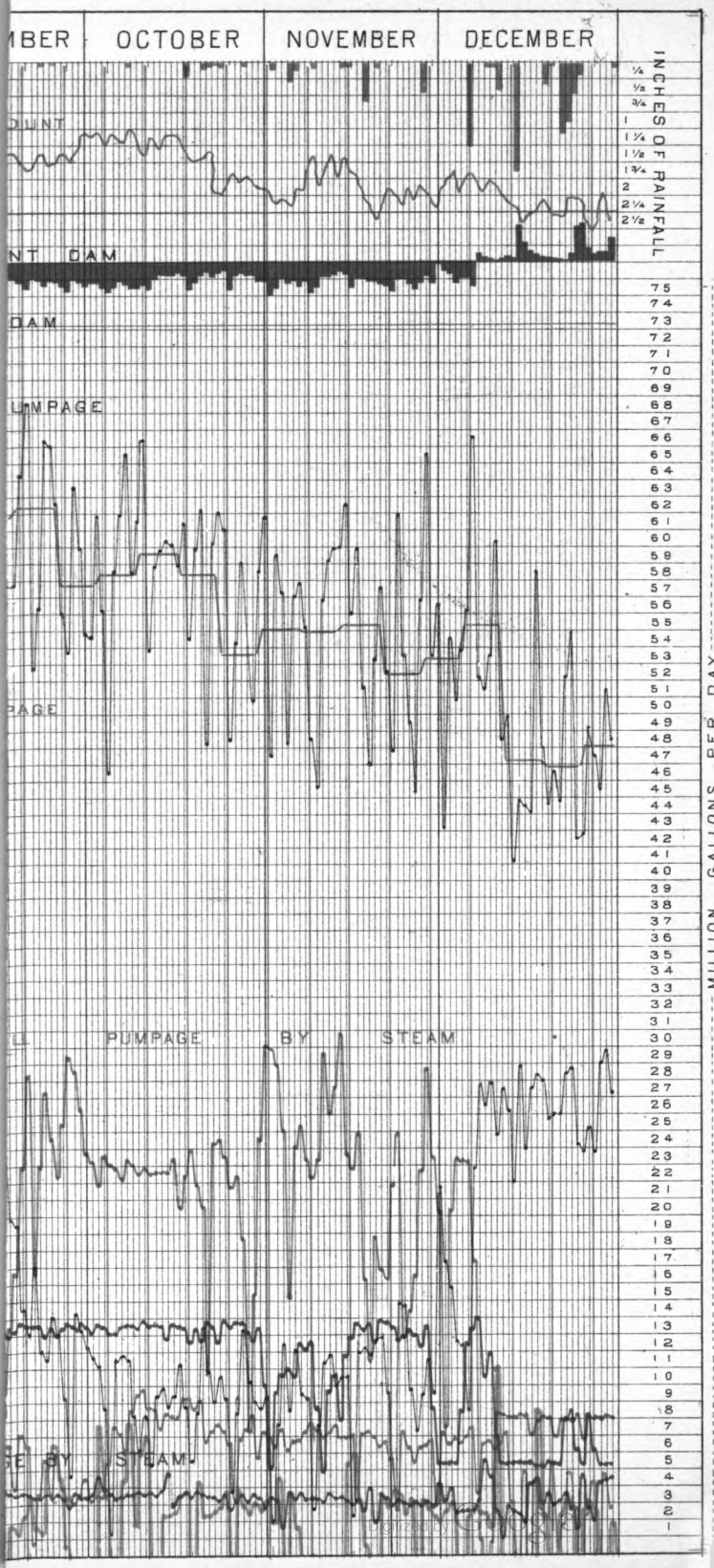
	8/10	10/10	4/12	6/12	8/12	10/12	12/12	4/16	6/16	12/16
Breeches Pipes	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Double Branches	1	13	13	35	1	11	29	.....	2	.....
Single Branches	3	8	108	38	10	9	1	7	.....	.....
Reducers	27	.....	13	8	7	.....	.....	.....	.....	3

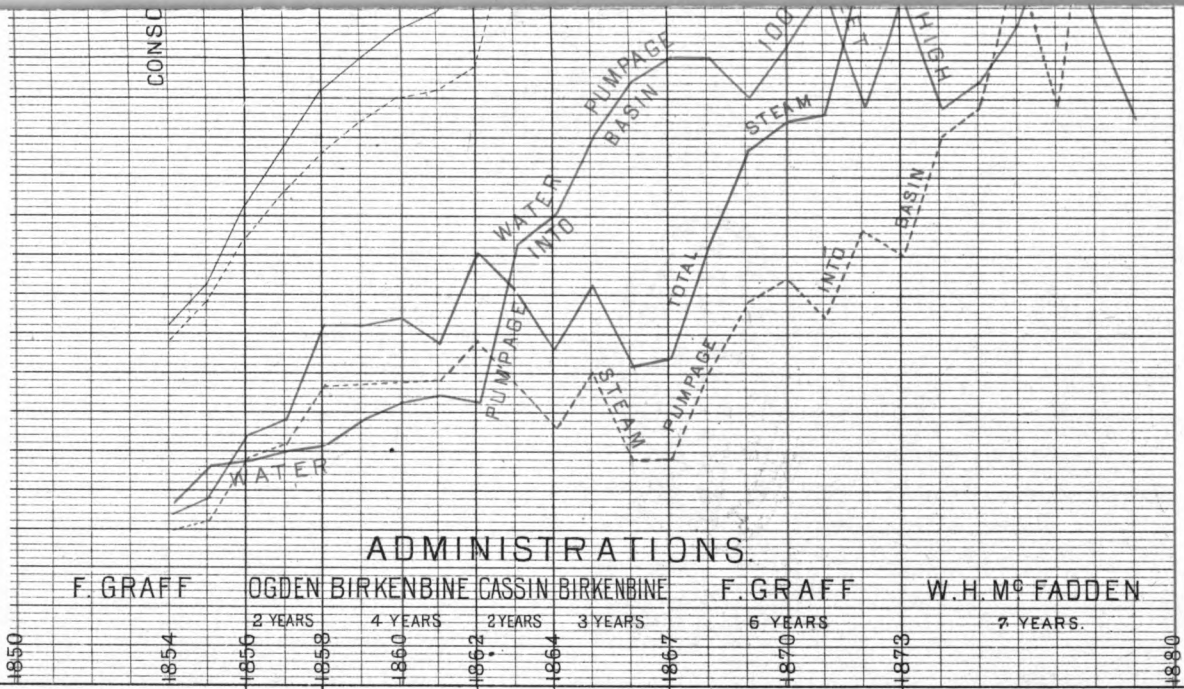
	16/16	6/18	4/20	6/20	8/20	10/20	12/20	16/20	18/20	20/20
Breeches Pipes	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
Double Branches	1	2	.....	12	1	.....	2	.....	.....	.....
Single Branches	5	.....	4	3	.....	2	2	1	.....	3
Reducers	.....	.....	.....	.....	.....	.....	.....	1	2	.....

	6/30	12/30	16/30	20/30	30/30	20/36	30/36	36/36	36/40	36x47 x60
Breeches Pipes	.....	.....	.....	.....	2	.....	.....	3	1	.....
Double Branches	3	2	.....	1	3	.....	.....	.....	.....	.....
Single Branches	.....	.....	1	.....	3	2	.....	.....	.....	.....
Reducers	.....	.....	.....	2	.....	.....	4	.....	.....	1

e YEAR 1879.


WATER
DEPARTMENT
PHILADELPHIA


MBER
OCTOBER
NOVEMBER
DECEMBER
INCHES OF RAINFALL
¼
½
¾
1
1 ¼
1 ½
1¾
2
2 ¼
2 ½
MILLION GALLONS PER DAY
PUMPAGE BY STEAM



LOANS CREATED						
MAR. 17. 1859			$ 221,500			
MAY 5. 1865				$ 1,000,000		
DEC. 26. 1868					$ 1,000,000	
MAR. 19. 1870					1,000,000	
JULY 8. 1871					2,122,000	
NOV. 23. 1872					970,000	
					$ 5,092,000	
LOANS EXPENDED			$ 317,124,51	$ 43,832,22	$ 691,953,65	$ 2,534,655,33*

$ 1,338,377.45*

* EAST PARK RESERVOIR ($ 1,327,000,00) OMITTED.